AN ANNOTATED CHECKLIST OF THE CRABS OF THE SUPERFAMILY PORTUNOIDEA RAFINESQUE, 1815, FROM THE PHILIPPINES (CRUSTACEA: DECAPODA: BRACHYURA)

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NATIONAL UNIVERSITY OF SINGAPORE
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DECLARATION

I hereby declare that this thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis.

This thesis has also not been submitted for any degree in any university previously.

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Nguyen Thanh Son

12 July 2013

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SUMMARY

The Indo-Malay-Philippines Archipelago has been considered as an area with the highest global marine biodiversity, and the Philippines is at the center of this "hot spot". Detailed studies on specific groups of marine organisms from the Philippines are nevertheless necessary to affirm the validity of this hypothesis. The Panglao Marine Biodiversity Projects (PANGLAO 2004 and PANGLAO 2005) were conducted in order to survey the biodiversity of marine life of the central Philippines. Materials collected from these expeditions, which intensely sampled a large number of shallow and deep-water habitats have already provided valuable material for many decapod crustacean studies. A large collection of swimming crabs (family Portunoidea Rafinesque, 1815 *sensu lato*) forms the basis of the present study. Portunoids are a large group of marine crabs which has important roles in commercial fisheries as well as ecosystem function. The present revised checklist of the Portunoidea of the Philippines records 115 species from 27 genera and subgenera, including one new genus, two new species, and eight new records for the archipelago. As a result of this study, two other new species are described from elsewhere in the Indo-West Pacific. The study also includes a revision of a small but commonly encountered group of species previously placed in the subgenus *Portunus* (*Achelous*) De Haan, 1833, and a group of species in the *Portunus* (*Xiphonectes*) *hastatoides* Fabricius, 1798, species group. This is the highest diversity of portunids known thus far from any area.

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CHAPTER 1.

GENERAL INTRODUCTION

The superfamily Portunoidea Rafinesque, 1815, is a group of marine crabs which are commonly known as swimming crabs. This group has an important role in commercial fisheries. According to the recent FAO's Fishery Statistics Summary (FAO, 2007), only two species of crab, both portunids, exceeded 150,000 tonnes in captures worldwide. In 2007, global production of the gazami crab, *Portunus trituberculatus* (Miers, 1876), was 367,237 tonnes, while that of the blue swimming crab, *P. pelagicus* (Linnaeus, 1758) (including its three cryptic species, cf. Lai et al., 2010), was 172,651 tonnes. Mud crabs of the genus *Scylla* De Haan, 1833 (with four species, Keenan et al., 1998), are also an important group used extensively in aquaculture. Besides the commercial value, the family Portunidae is very important to biodiversity with high number of species ecologically in the variety of niches occupied: there are currently 410 species placed into 39 genera (Ng et al., 2008).

The portunid crabs of the Indo-West Pacific region have largely been treated on a per region basis, as demonstrated by the work of different authors on the portunid fauna of Madagascar (Crosnier, 1962), Tanzania (Heath, 1973), the Arabian Gulf (Stephenson, 1946; Apel & Spiridonov, 1998) and the waters surrounding the Indian subcontinent (Chopra, 1935; Chhapgar, 1957; Sankarankutty, 1966;). The portunid fauna of China, Taiwan and Hong Kong has been treated by Gordon (1930, 1931), Shen (1932, 1934), Dai & Yang

(1991) and Ng et al. (2001). The Japanese portunids have also been discussed by Sakai (1939, 1965, 1976), Takeda (1975, 1989) and Takeda et al. (1974, 1976). The Portunidae of Malaya was studied by Ow-Yang (1963) (see also Lovett, 1981), followed by an updated checklist of genus *Charybdis* and *Thalamita* from Malaysia and Singapore by Wee & Ng (1995). The Australian portunid crabs have been extensively studied by Stephenson and co-workers (e.g., Stephenson & Hudson, 1956; Stephenson et al., 1957; Stephenson & Campbell, 1959, 1960; Stephenson, 1961) and the Australian portunids were listed in the recent compendium by Davie (2002).

The Indo-Malay-Philippines Archipelago has been considered to be an area with the highest marine biodiversity, and the Philippines is said to be the center of this "hotspot" (Bouchet et al., 2002, 2009; Carpenter & Springer, 2005). For that reason, the Philippine portunid fauna could be a representative of the overall Southeast Asian portunid fauna. However, the brachyuran fauna of the Philippines is still not well known. Estampador (1937) was the first to compile a comprehensive checklist of Philippine crustacean decapods based on collections of the University of Philippines and the Bureau of Science (both located in Manila), and including data from the reports of previous surveys such as the U.S. Exploring Expedition (1838-1842) (see Dana, 1852), the *Samarang* expedition (1843-1846) (see Adams & White, 1848, 1849), the *Challenger* expedition (1873–1876) (see Miers, 1886; Bate, 1888; Henderson, 1888), and the Siboga Expedition (see “Siboga Expéditie” by Dana, 1916, 1917, 1929; Tesch, 1918; Ihle, 1918). This checklist was followed by an updated version (Estampador, 1959), containing 58 families, 207 genera, and 522 species. Of these, the Portunidae was represented by 32 species in seven

genera. Due to changes in brachyuran systematics since these checklists were published, a re-examination of the specimens listed therein is needed. For example, the species "*Neptunus xanthusii* (Stimpson)" appears in Estampador's (1937, 1959) list, although *Portunus xantusii* (Stimpson, 1860) is limited to the western coast of North American continent, and is unlikely to be present in the western Pacific, including the Philippines. Unfortunately, the buildings of the University of Philippines and the Bureau of Science were destroyed, as Manila was severely bombarded towards the end of the Second World War, and the zoological collections housed there were irrecoverably damaged (Estampador, 1959). Despite the best efforts of other workers to locate Estampador's personal collection in the Philippines, if any survived, there has been no success (see discussion in Keenan et al., 1998; Mendoza & Ng, 2010). Additional records on the Philippine portunid fauna were contributed by Stephenson (1972a, b, 1976), who worked on the Indo-West Pacific portunid crabs in the Copenhagen Zoological Museum (Denmark) and the Smithsonian Institution (USA), which were collected in expeditions and by individual collectors. Moosa (1981a) reported 30 species and nine genera of Portunidae collected by the MUSORSTOM 1 expedition to the Philippines in 1976. Later, Cariaso & Garcia (1986) published a book on Philippine swimming crabs, which was part of the Flora & Fauna series sponsored by the Philippine government, which listed 44 species in 13 genera and also provided Philippine locality of each species. Since then, several new records of Portunidae from the Philippines were reported by various authors (Crosnier, 2002b; Takeda, 2010).

The Panglao Marine Biodiversity Project (PANGLAO 2004) was an international project under a permit granted by the Philippine Department of Agriculture, through its Bureau of Fisheries and Aquatic Resources (BFAR). During this project, numerous methods were used to sample crustaceans in the Bohol Sea around Panglao Island, in the central Philippines (see Bouchet et al., 2009). The highly successful PANGLAO 2004 expedition was followed by the PANGLAO 2005 to survey the deep-sea benthic fauna of Bohol Sea and adjacent waters (Richer de Forges et al., 2009). The AURORA 2007 expedition, which was conducted along the eastern coast of Luzon Island (provinces of Aurora and Quezon), also provided an additional interesting array of benthic fauna. Specimens collected from these expeditions have been invaluable sources of material for systematic studies. One major group of crustaceans in these collections for which there is excellent material, but remains understudied, is the superfamily Portunoidea. This abundant material presents a good opportunity for a revision of the checklist of the Portunidae of the Philippines.

CHAPTER 2.

MATERIAL AND METHODS

Checklist

The checklist of Philippine Portunoidea presented in this thesis is a compilation of known records from the scientific literature and as well as newly collected material. Records not appearing in reliable sources (i.e. not peer-reviewed) have generally been avoided. The new material reported here was largely collected during the PANGLAO 2004 and 2005 expeditions to the central Philippines (see Bouchet et al., 2009; Richer de Forges et al., 2009) and several small expeditions to the same area by independent collectors, as well as from the AURORA 2007 expedition off the eastern coast of Luzon Island.

Each sampling station of the recent Philippine expeditions was given an alphanumeric code, wherein the letter prefix denotes sampling method utilized. For PANGLAO 2004 stations, B = coral brushing, L = "lumun – lumun" nets, M = intertidal hand-picking, P = tangle ("pamo") nets, R = handcollecting by scuba diver, S = vacuum suction, and T = trawling. Description of the methods used in this expedition are provided in Bouchet et al. (2009). In PANGLAO 2005 and AURORA 2007, station codes as in Richer de Forges et al. (2009) are: CA = Traps, CC = Otter trawl, CP = Beam trawl and DW = Warén dredge.

The classification in this thesis mainly follows Ng et al. (2008), with some changes as proposed in Schubart & Reuschel (2009), Nguyen & Ng

(2010) adopted here. The detail of each change is discussed further in Chapter 3 of this thesis.

Many genera have been described well by different studies (Leene, 1938; Crosnier, 1962; Stephenson & Hudson, 1956; Stephenson et al., 1957; Stephenson & Campbell, 1959, 1960; Stephenson, 1961; Wee & Ng, 1995; Apel & Spiridonov, 1998) therefore the diagnosis of those species are unnecessary. Identification was done by following Stephenson's key (Stephenson, 1972b).

The territory of the Republic of the Philippines as defined here (fig. 1), includes all territorial waters, as allowed by the 1982 United Nations Convention on the Law of the Sea (UNCLOS).

Material examined

Measurements of the material examined are expressed as carapace width (CW) by carapace length (CL), in millimeters (mm), with CW measured across the widest point, and the CL measured across median axis of the carapace. Depth is presented in meters (m). The following contractions are also used: coll. = collected by; det. = determined by; fms = fathoms; juv. = juvenile; ovig. = ovigerous; and stn. = station.

Photographs were taken using Nikon DSLR cameras D200, D7000. Illustrations were made by camera lucida attachments using Nikon (SMZ 800 and SMZ 10) stereocroscopes.

All the material examined in this dissertation is deposited in the ZRC – Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore. For the *Portunus hastatoides*

complex revision and *Cavoportunus* study, specimens from other museums were borrowed and used: Natural History Museum (NHM), London, U.K.; Zoological Reference Collection of the Raffles Museum of Biodiversity Research (ZRC), National University of Singapore; Queensland Museum (QM), Brisbane, Australia; Zoological Museum, University of Copenhagen (ZMUC), Copenhagen, Denmark; Zoological Museum of Kiel University (ZMK), Kiel, Germany; The Marine Biological Museum of the Chinese Academy of Sciences (MBMCAS), Institute of Oceanology, Academia Sinica, Qingdao, Shandong, China; Wakayama Prefectural Museum (WMNH), Wakayama, Japan; National Museum of Nature and Science (NSMT), Tokyo, Japan.

Definition of Terms

Terms used for adult morphology were modified after Crosnier (1962), Wee & Ng (1995) and Apel & Spiridonov (1998) as indicated in figs. 1-3. The five pairs of pereiopods are also called P1-P5, with P1 as the cheliped, P2-P4 for first to third ambulatory legs, and P5 for the natatory legs. The abbreviations G1 and G2 are used for the male first and second gonopods, respectively.

In describing the male gonopods, the word "spines" is used to describe structures that are short and rigid, normally conical shape; on the other hand, the word "bristles" refers to structures that are longer, slender, more flexible.

Fig. 1. Map of the Philippines and its territorial waters. (www. wikipedia.com)

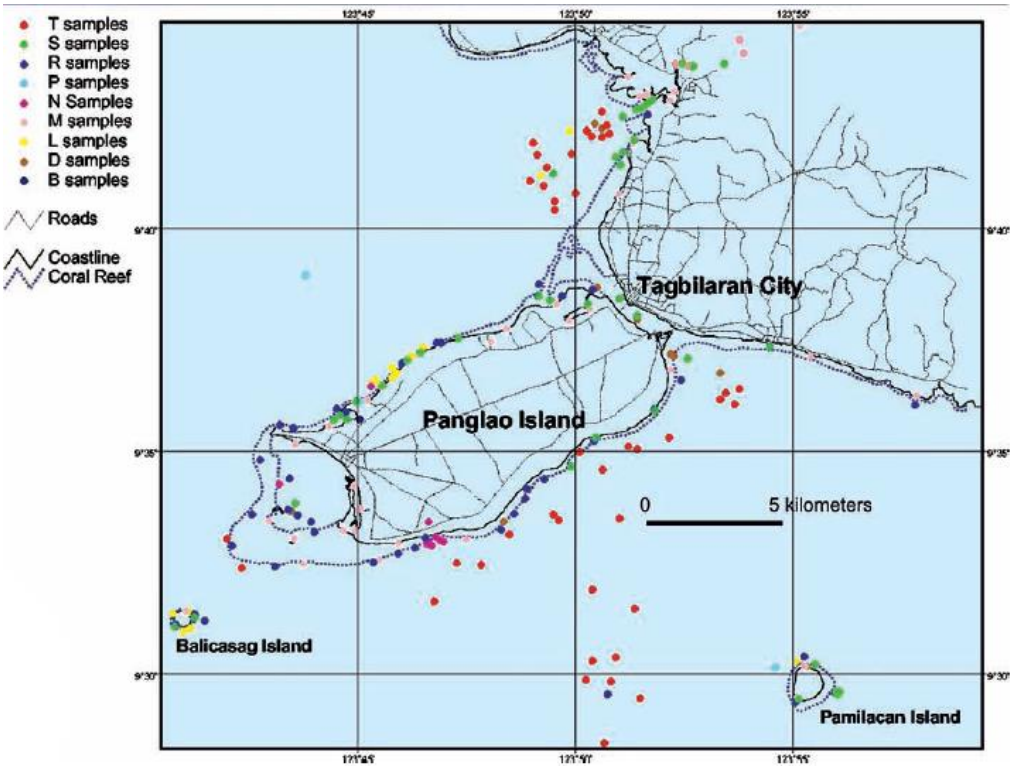


Fig. 2. The sampling sites for PANGLAO 2004 expedition. (adapted from Bouchet et al., 2009)

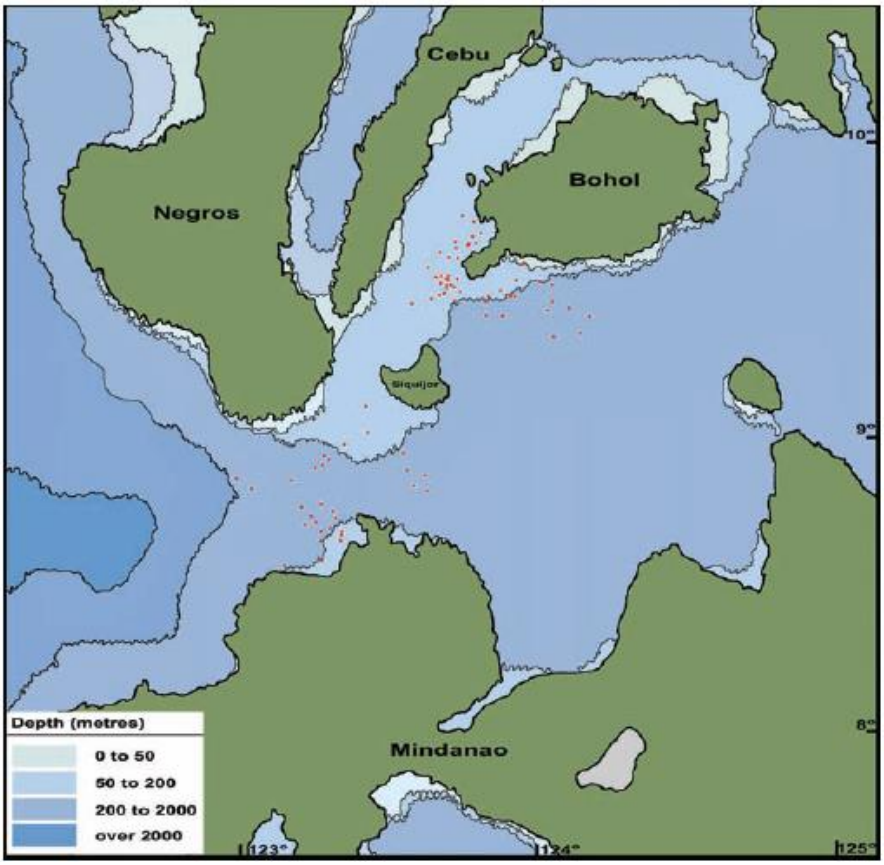
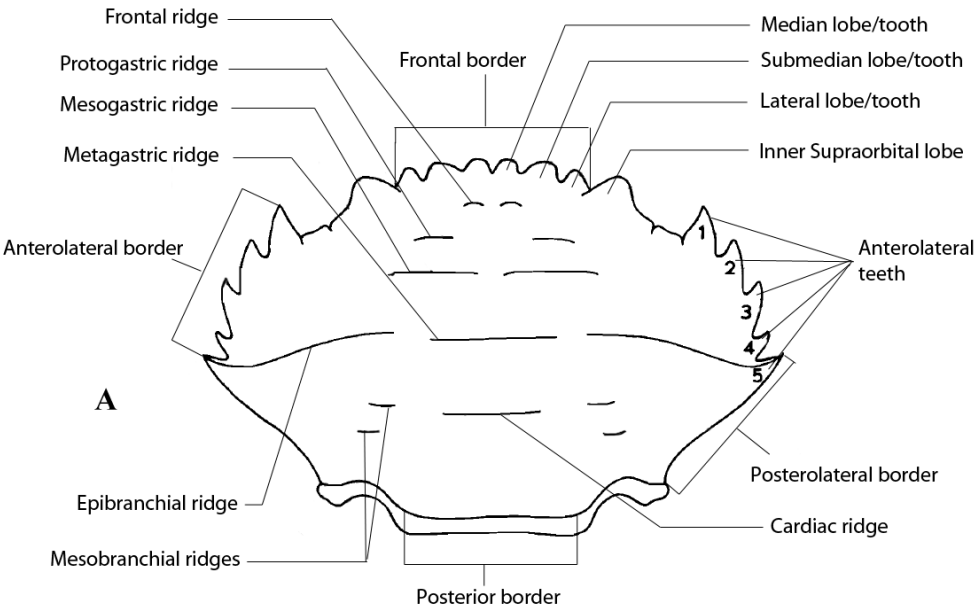


Fig. 3. The sampling sites for PANGLAO 2005 expedition. (Adapted from Richer de Forges et al., 2009)



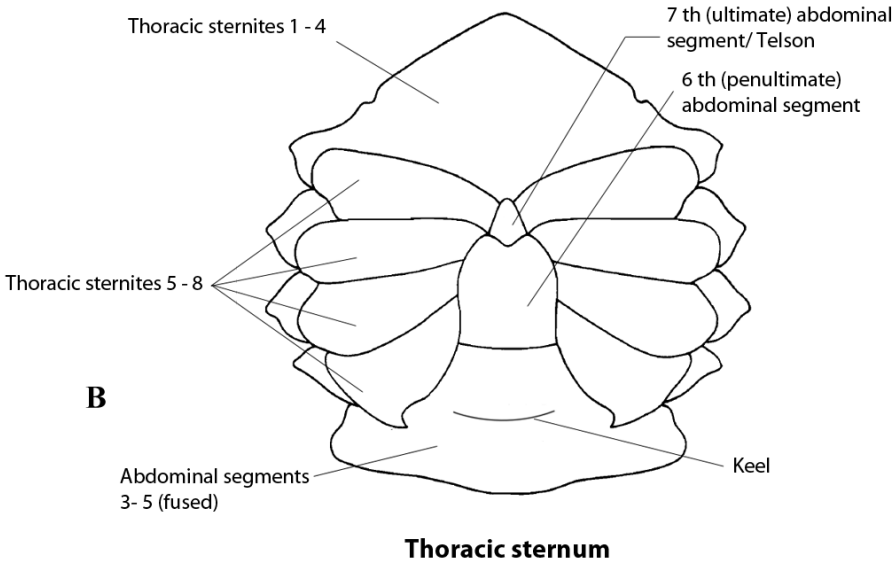


Fig. 4. General anatomy of a portunoid crab. A. Carapace, dorsal view; B. Male thoracic sternum. (Adapted from Crosnier, 1962; Wee & Ng, 1995)

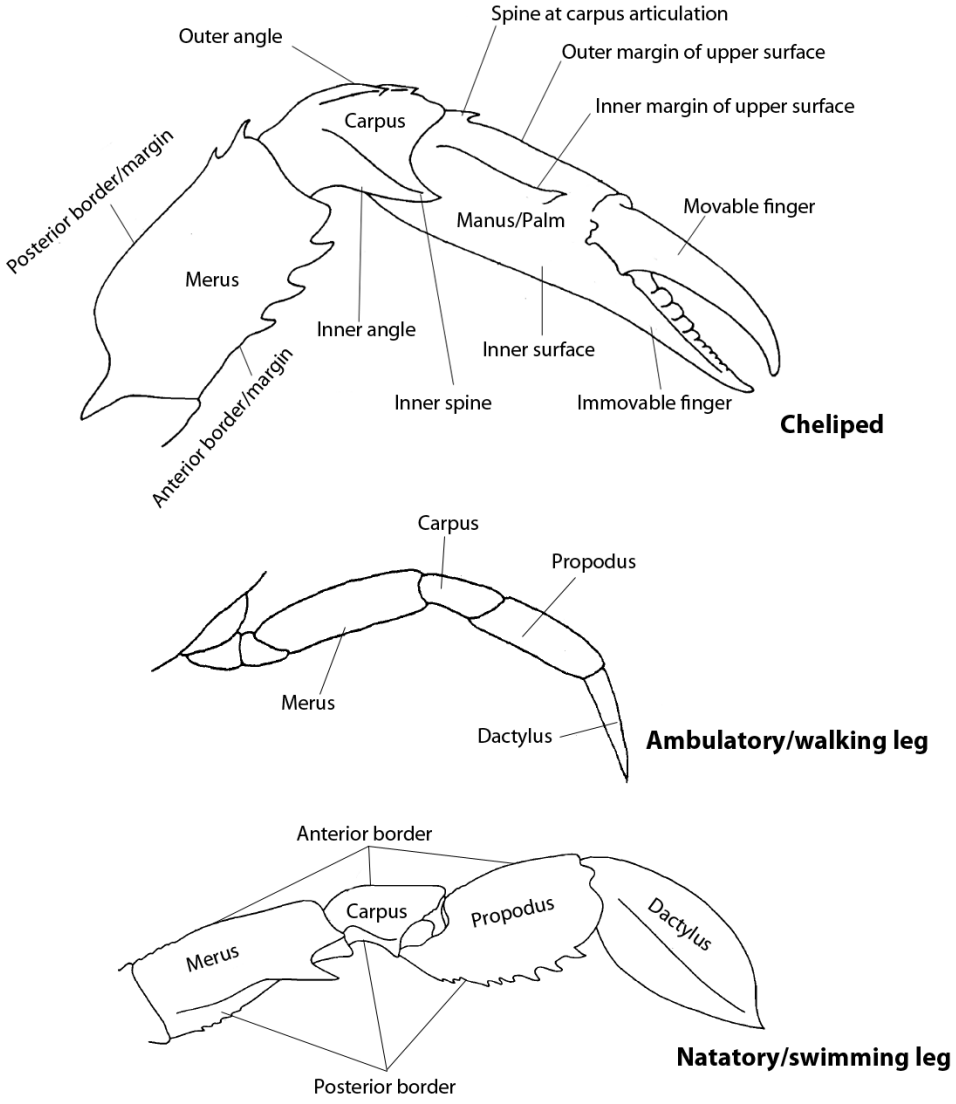


Fig. 5. General anatomy of pereopods. (Adapted from Crosnier, 1962; Wee & Ng, 1995).

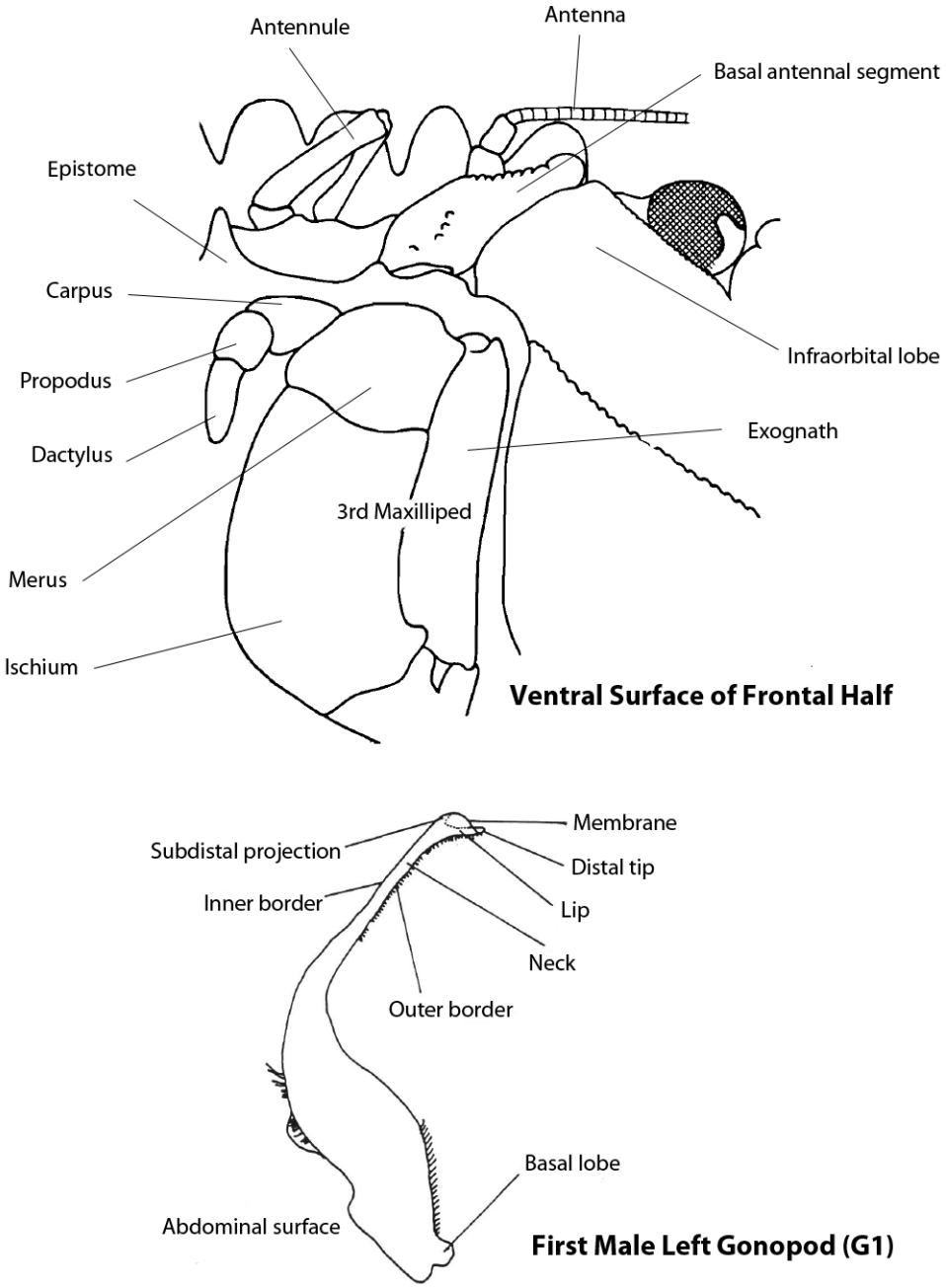


Fig. 6. General anatomy of antero-ventral region and G1. (Adapted from Crosnier, 1962; Wee & Ng, 1995)

CHAPTER 3.

AN ANNOTATED CHECKLIST OF THE CRABS OF THE SUPERFAMILY PORTUNOIDEA RAFINESQUE, 1815, FROM THE PHILIPPINES (CRUSTACEA: DECAPODA: BRACHYURA)

LIST OF SPECIES

A total of 115 species in 21 genera and three families of Portunoidea are now known from the Philippine territorial waters, including two new species described in this study.

* Indicates a new record for the Philippines.

FAMILY GERYONIDAE COLOSI, 1923

Genus *Benthochascon* Alcock & Anderson, 1899

Benthochascon hemingi Alcock & Anderson, 1899

Genus *Ovalipes* Rathbun, 1898

Ovalipes iridescens (Miers, 1886)

FAMILY POLYBIIDAE ORTMANN, 1893

Genus *Liocarcinus* Stimpson, 1871

Liocarcinus strigilis (Stimpson, 1858)*

FAMILY PORTUNIDAE RAFINESQUE, 1815

Genus *Caphyra* Guérin, 1832

Caphyra loevis (A. Milne Edwards, 1869)

Genus *Carupa* Dana, 1851

Carupa tenuipes Dana, 1852

Genus *Carupella* Lenz & Strunck, 1914

Carupella natanensis Lenz & Strunck, 1914

Genus *Catoptrus* A. Milne Edwards, 1870

Catoptrus marigondonensis Takeda, 2010

Catoptrus nitidus A. Milne Edwards, 1870

Genus *Cavoportunus* Nguyen & Ng, 2010

Cavoportunus dubius (Laurie, 1906)

Genus *Charybdis* De Haan, 1833

Charybdis (*Charybdis*) *amboinensis* Leene, 1938

Charybdis (*Charybdis*) *anisodon* (De Haan, 1850)

Charybdis (*Charybdis*) *annulata* (Fabricius, 1798)

Charybdis (*Charybdis*) *callianassa* (Herbst, 1789)

Charybdis (*Charybdis*) *feriata* (Linnaeus, 1758)

Charybdis (*Charybdis*) *hawaiensis* Edmondson, 1954*

Charybdis (*Charybdis*) *hellerii* (A. Milne Edwards, 1867)

Charybdis (*Charybdis*) *miles* (De Haan, 1835)

Charybdis (*Charybdis*) *natator* (Herbst, 1794)

Charybids (*Charybdis*) *orientalis* Dana, 1852

Charybdis (*Charybdis*) *philippinensis* Ward, 1941

Charybdis (*Charybdis*) *riverandersoni* Alcock, 1899

Charybdis (*Charybdis*) *rufodactylus* Stephenson & Rees, 1968*

Charybdis (*Charybdis*) *vannamei* Ward, 1941

Charybdis (*Charybdis*) *variegata* (Fabricius, 1798)

Charybdis (*Goniohellenus*) *hongkongensis* Shen, 1934

Charybdis (*Goniohellenus*) *ornata* (A. Milne Edwards, 1861)

Charybdis (*Goniohellenus*) *truncata* (Fabricius, 1798)

Charybdis (*Goniohellenus*) *vadorum* Alcock, 1899

Charybdis (*Gonioneptunus*) *bimaculata* (Miers, 1886)

Charybdis (*Gonioneptunus*) *padadiana* Ward, 1941

Charybdis (*Goniosupradens*) *acutifrons* (De Man, 1879)

Charybdis (*Goniosupradens*) *obtusifrons* Leene, 1937

Genus *Cycloachelous* Ward, 1942

Cycloachelous granulatus granulatus (H. Milne Edwards, 1834)

Cycloachelous orbicularis (Richters, 1880)

Cycloachelous orbitosinus Rathbun, 1911

Genus *Gonioinfradens* Leene, 1938

Gonioinfradens paucidentatus (A. Milne Edwards, 1861)

Genus *Laleonectes* Manning & Chace, 1990

Laleonectes nipponensis (Sakai, 1938)

Genus *Libystes* A. Milne Edwards, 1867

Libystes nitidus A. Milne-Edwards, 1867

Libystes cf. *villosus* Rathbun, 1924

Genus *Lissocarcinus* Adams & White, 1849

Lissocarcinus arkati Kemp, 1923

Lissocarcinus boholensis Semper, 1880

Lissocarcinus laevis Miers, 1886

Lissocarcinus orbicularis Dana, 1852

Lissocarcinus polybiodes Adams & White, 1849

Genus *Lupocyclus* Adams & White, 1849

Lupocyclus inaequalis (Walker, 1887)

Lupocyclus philippinensis Semper, 1880

Lupocyclus rotundatus Adams & White, 1849

Lupocyclus tugelae Barnard, 1950

Genus *Parathranites* Miers, 1886

Parathranites orientalis (Miers, 1886)

Parathranites granosus Crosnier, 2002

Parathranites tuberogranosus Crosnier, 2002

Genus *Podophthalmus* Lamarck, 1801

Podophthalmus nacreus Alcock, 1899

Podophthalmus vigil (Fabricius, 1798)

Genus *Portunus* Weber, 1795

Portunus (*Lupocycloporus*) *gracilimanus* (Stimpson, 1858)

Portunus (*Lupocycloporus*) *minutus* (Shen, 1937)

Portunus (*Portunus*) *pelagicus* (Linnaeus, 1758)

Portunus (*Portunus*) *pubescens* (Dana, 1852)

Portunus (*Portunus*) *sanguinolentus sanguinolentus* (Herbst, 1783)

Portunus (*Xiphonectes*) *subtilis* **sp. nov.***

Portunus (*Xiphonectes*) *brockii* (De Man, 1887)

Portunus (*Xiphonectes*) *iranjae* Crosnier, 1962

Portunus (*Xiphonectes*) *macrophthalmus* Rathbun, 1906

Portunus (*Xiphonectes*) *pulchricristatus* (Gordon, 1931)

Portunus (*Xiphonectes*) *rugosus* (A. Milne Edwards, 1861)

Portunus (*Xiphonectes*) *spinipes* (Miers, 1886)

Portunus (*Xiphonectes*) *spiniferus* Stephenson & Rees, 1967

Portunus (*Xiphonectes*) *stephensoni* Moosa, 1981

Portunus (*Xiphonectes*) *tenuipes* (De Haan, 1835)

Portunus (*Xiphonectes*) *trilobatus* Stephenson, 1972

Portunus (*Xiphonectes*) *tuberculosus* (A. Milne Edwards, 1861)

Portunus (*Xiphonectes*) *unidens* (Laurie, 1906)

Portunus (*Monomia*) *argentatus argentatus* (A. Milne Edwards, 1861)

Portunus (*Monomia*) *calla* **sp. nov.***

Portunus (*Monomia*) *euglyphus* (Laurie, 1906)

Portunus (*Monomia*) *pseudoargentatus* Stephenson, 1961

Portunus (*Monomia*) *rubromarginatus* (Lanchester, 1900)

Genus *Scylla* De Haan, 1833

Scylla olivacea (Herbst, 1796)

Scylla panamamosain Estampador, 1949

Scylla serrata (Forskål, 1775)

Scylla tranquebarica (Fabricius, 1798)

Genus *Thalamita* Latreille, 1829

Thalamita admete (Herbst, 1803)

Thalamita auauensis Rathbun, 1906

Thalamita chaptalii (Audouin, 1826)

Thalamita crenata Rüppell, 1830

Thalamita corrugata Stephenson & Rees, 1961

Thalamita danae Stimpson, 1858

Thalamita coeruleipes Hombron & Jacquinot, 1846

Thalamita demani Nobili, 1905

Thalamita foresti Crosnier, 1962

Thalamita gatavakensis Nobili, 1906

Thalamita gracilipes (A. Milne Edwards, 1873)

Thalamita granosimana Borradaile, 1902

Thalamita imparimana Alcock, 1899

Thalamita integra integra Dana, 1852

Thalamita kagosimensis Sakai, 1939

Thalamita malaccensis Gordon, 1938*

Thalamita mitsiensis Crosnier, 1962

Thalamita multispinosa Stephenson & Rees, 1967*

Thalamita oculea Alcock, 1899

Thalamita parvidens (Rathbun, 1907)

Thalamita picta Stimpson, 1858

Thalamita philippinensis Stephenson & Rees, 1967

Thalamita prymna (Herbst, 1803)

Thalamita pseudopelsarti Crosnier, 2002*

Thalamita pseudopoissoni Stephenson & Rees, 1967

Thalamita quadrilobata Miers, 1884

Thalamita sexlobata Miers, 1886

Thalamita sima H. Milne Edwards, 1834

Thalamita spinicarpa Wee & Ng, 1995*

Thalamita spinimana Dana, 1852

Thalamita spinifera Borradaile, 1903

Thalamita spinimera Stephenson & Rees, 1967*

Thalamita stephensoni Crosnier, 1962*

Genus *Thalamitoides* A. Milne Edwards, 1869

Thalamitoides quadridens A. Milne Edwards, 1869

Thalamitoides tridens tridens A. Milne Edwards, 1869

SYSTEMATIC ACCOUNT

Several changes regarding to the Portunoidea taxonomy are proposed and discussed in this study. A new genus *Cavoportunus* has described, while a previously synonymised name, *Cycloachelous* Ward, 1942, was revalidated (Nguyen & Ng, 2010). Two new species are described and one species is synonymised. The G1 structures of two species are described and illustrated for the first time.

FAMILY GERYONIDAE COLOSI, 1923

Remarks. – Two genera *Benthochascon* Alcock & Anderson, 1899, and *Ovalipes* Rathbun, 1898, have been moved from the family Portunidae Rafineque, 1815 sensu Ng et al. (2008) to Geryonidae Colosi, 1923 based on recent study by Schubart & Reuschel (2009). In that study, mitochondrial 16S-NDH1 gene and nuclear H3 gene were used. The dataset (with high confidence levels) shown that the representatives of two genera *Benthochascon* (*Benthochascon hemingi* Alcock & Anderson, 1899) and *Ovalipes* [*Ovalipes trimaculatus* (De Haan, 1833) and *Ovalipes iridescens* (Miers, 1886)] did not cluster together with the clade that contain the core of the family Portunidae, but instead fall within the same clade with two representatives (*Chaceon granulatus* (Sakai, 1978) and *Geryon longipes* A. Milne Edwards, 1882) of family Geryonidae. The data provided by Schubart

& Reuschel (2009) is highly convincing. As such, I have followed their classification.

Genus *Benthochascon* Alcock & Anderson, 1899

Benthochascon Alcock & Anderson, 1899: 10; Ng, 2000: 310.

Carcinonectes Stephenson, 1972a: 129.

Type species. – *Benthochascon hemingi* Alcock & Anderson, 1899, by subsequent designation.

Remarks. – The history of the genus *Benthochascon* is somewhat confusing. The genus was originally established for *B. hemingi* Alcock & Anderson, 1899, collected off India. A second species, *B. schmitti* Rathbun, 1931, from the central Atlantic, was added by Rathbun (1931). Sakai (1969) described a third species from Japan, as *B. elongatum* Sakai, 1969. Stephenson (1972a) established a new genus for a new species from New Caledonia, *Carcinonectes pacificus* Stephenson, 1972, which was later synonymised with *Benthochascon hemingi* by Davie & Short (1989). Števčić (1991) created a new genus, *Brusinia*, Števčić, 1991, for *B. elongatum* Sakai, 1969, and as such, only two species were left in *Benthochascon*. Ng (2000) reviewed *Benthochascon* again and found that the two species were different in several important characters and established a new genus, *Raymanninus*, for *B. schmitti*. Thus, the genus *Benthochascon* is now monotypic, containing only *B. hemingi*.

Benthochascon hemingi Alcock & Anderson, 1899

(Plate 1A)

Benthochascon hemingi Alcock & Anderson, 1899: 10; Alcock, 1899a: 69 pl. 3, fig. 2; Alcock, 1899b: 15; Doflein, 1904: 90, pls. 29, 41 figs. 1, 2; Alcock and MacGilchrist, 1905: 76, figs. 4, 4a; Sakai, 1965: 39, 44, pl. 6 fig. 2; Serène, 1968: 67; Sakai, 1976: 333, pl. 114; Miyake, 1983: 79, pl. 27, fig. 3; Davie and Short, 1989: 183, fig. 14D; Števčić, 1991: 128; Moosa, 1996: 513, figs. 9d-e; Ng, 2000: 311, figs. 1-4; Ng et al., 2008: 149, fig. 115.

Carcinonectes pacificus Stephenson, 1972a: 129, fig. 3; Stephenson, 1972b: 3.

Material examined. – Philippines: 1 male (71.6 × 63.3 mm) (ZRC), AURORA 2007, stn. CP2731; 2 males (26.3 × 23.2 mm; 24.7 × 21.1 mm) (ZRC), AURORA 2007, stn. CP2700.

Remarks. – Ng (2000) updated the status of *B. hemingi* with photographs and illustrations. He noted that the anterolateral margin of one unusual specimen from the northeast of Calagula Islands, Philippines (ZRC 1996.1875) with the first and second teeth almost fused, and opined that the fusion of these teeth may be associated with specimen size (69.5 × 65.5 mm). However, a slightly larger male specimen in the new collection from the eastern coast of Luzon (CP2731) (71.7 × 63.3 mm) also has the two teeth well separated. Therefore, it is unlikely that this variation is associated with size and the afore-mentioned specimen is just an aberrant *B. hemingi*.

Genus *Ovalipes* Rathbun, 1898

Platyonichus Latreille, 1825: 151 [not *Platyonichus* Latreille, 1818: 4 (= *Portumnus* Leach, 1814)].

Anisopus De Haan, 1833: 3, 12. Not *Anisopus* Meigen, 1803, p. 264. (Diptera).

Platyonychus Voigt, 1836: 104; Dana, 1851: 130; Miers, 1886: 201.

Ovalipes Rathbun, 1898: 597; Rathbun, 1930: 18; Sakai, 1939: 374; Barnard, 1950: 150; Stephenson & Campbell, 1960: 88; Crosnier, 1962: 20; Garth & Stephenson, 1966: 12; Stephenson & Rees, 1968b: 215.

Aeneacancer Ward, 1933: 381; McNeill, 1953: 93.

Type species. – *Cancer ocellatus* Herbst, 1799 (= *Ovalipes ocellatus*), by original designation.

Ovalipes iridescens (Miers, 1886)

Platyonychus iridescens Miers, 1886: 202, pl. 17 fig. 2.

Ovalipes iridescens – Stephenson & Rees, 1968b: 235, figs. 1G, 2F, 3F, 4F, pls. 36D, 40A, 41A, 42G; Stephenson, 1972a: (record only); Stephenson, 1972b: 6, 24; Stephenson, 1976: 12.

Material examined. – None.

Remarks. – This relatively uncommon species was recorded from the Philippines (off Sibutu Island) by Stephenson (1972b, 1976).

FAMILY POLYBIIDAE ORTMANN, 1893

Remarks. – The phylogenetic results derived from mtDNA dataset (mitochondrial 16S-NDH1 gene) by Schubart & Reuschel (2009) showed that representatives of Polybiinae (*Liocarcinus* and *Polybius*) and Carcininae (*Portumnus* and *Carcinus*) group together with the families Pirimelidae and Thiidae as separate lineages. Therefore, the subfamilies Polybiinae and Carcininae should be excluded from Portunidae and should be recognised as separate families. I agree with their conclusion and follow these changes in this study.

Genus *Liocarcinus* Stimpson, 1871

Liocarcinus Stimpson, 1871: 146 (footnote).

Type species. – *Portunus holsatus* Fabricius, 1798 (= *Liocarcinus holsatus*), by original designation.

Remarks. – According to Ng et al. (2008), *Liocarcinus* requires a taxonomic revision.

Liocarcinus strigilis (Stimpson, 1858)*

(Fig. 7)

Portunus corrugatus – De Haan, 1833: 40; Miers, 1879: 34; Miers, 1886: 200; Ortmann, 1893: 70; Fulton & Grant, 1906: 18. [not *Cancer corrugatus* Pennant, 1777].

Portunus strigilis Stimpson, 1858: 38; Palmer, 1927: 899.

Liocarcinus strigilis – Rathbun, 1902: 25; Stimpson, 1907: 74, pl. ix, fig. 6; Parisi, 1916: 170; Urita, 1926: 3.

Portunus corrugatus strigilis Stimpson - Balss, 1922: 101; Yokoya, 1933: 173; Sakai, 1934: 301; Sakai, 1936: 128, pl. 32, fig. 1 ; Sakai, 1939: 377, pl. xliii, fig. 1.

Liocarcinus corrugatus – Hale, 1927: 148, fig. 149; McNeill & Ward, 1930: 379; Guiler, 1952: 39. [not *Cancer corrugatus* Pennant, 1777].

"Portunus" corrugatus – Palmer, 1927: 881, fig. 2A-H, 899-900 (discussion on *P. subcorrugatus* and *P. strigilis*). [not *Cancer corrugatus* Pennant, 1777].

Macropipus corrugatus – Stephenson & Campbell, 1960: 92, figs. 1E, 2G, Pl. **2** fig. 4, pl. 5G. [not *Cancer corrugatus* Pennant, 1777].

(?) *Portunus corrugatus* – Borradaile, 1916, p. 98, fig. 9. = *P. borradailei* Bennett, 1930: 256, figs. 1-4. [not *Cancer corrugatus* Pennant, 1777].

Material examined. – Philippines: 1 male (26.3 × 22.2 mm) (ZRC), northeast coast of Panglao island, coll. J. Arbasto & J.C. Mendoza, 12 Dec. 2005; 2 females (29.8 × 25.5 mm, 32.9 × 28.0 mm) (ZRC),Visayas, Bohol, off Balicasag I., coll. local fishermen, 2 Mar. 2004; 1 male (35.5 × 29.0 mm) (ZRC), PANGLAO 2004, Maribohoc Bay, Bohol Island, stn. P2, 400 m, tangle nets, coll. local fishermen, 30 May 2004; 3 females (30.5 × 25.2 mm, 28.2 × 24.2 mm, 29.5 × 25.1 mm) (ZRC 2001.0634), Bohol, off Balicasag I., 50-500 m, tangle nets, coll. local fishermen, 28 Nov. 2001; 1 male (38.8 × 32 mm) (ZRC), Panglao I. Maribohoc Bay, 100-300 m, coll. T. J. Arbasto, Nov. 2003 - Apr. 2004; 1 male (29.8 × 25.0 mm) (ZRC), PANGLAO 2004, Balicasag I., stn. P3, 9°31.1'N, 123°41.5'E, ~100 m, tangle nets, coll. local fishermen, 31 May 2004; 1 male (23.5 × 19.7 mm) (ZRC), Visayas, Bohol, off Balicasag I., coll. local fishermen, 2 Mar 2004; 3 males (34.7 × 28.9 mm, 33 ×

27.1 mm, 35.1 × 29.5 mm), 3 females (31.6 × 26.4 mm, 31.3 × 26.1 mm, 25 × 21.2 mm) (ZRC), Visayas, Bohol, off Balicasag I., 27 Jul. 2003.

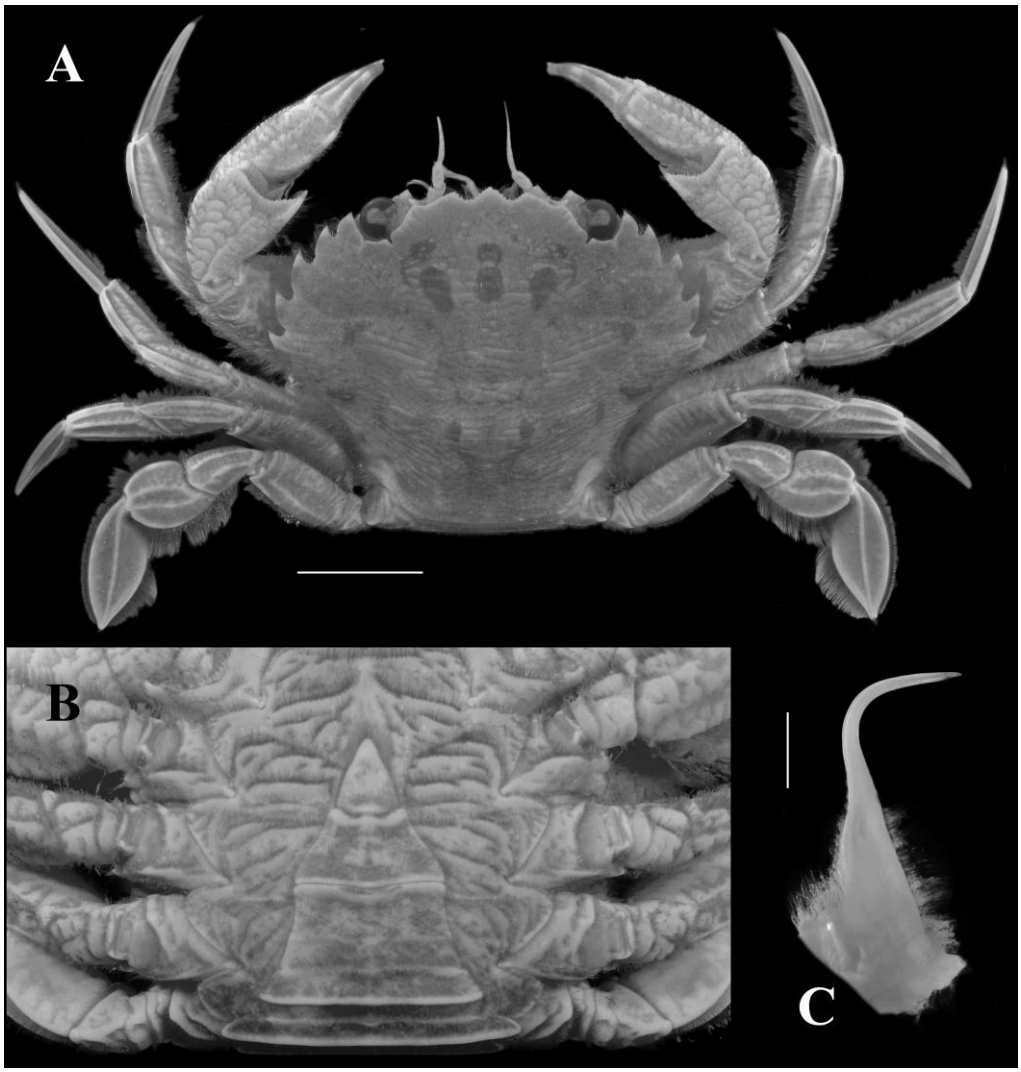


Fig. 7. *Liocarcinus strigilis* (Stimpson, 1858). A, B. Male (34.7 × 28.9 mm); C. Male (33 × 27.1 mm). A. Habitus, dorsal view; B. Carapace, ventral view; C. G1. Scales: A = 10 mm; C = 1.0 mm.

Remarks. – *Liocarcinus corrugatus* (Pennant, 1777) was originally described from Skye, Scotland, and is characterised by a wrinkled carapace. *Portunus corrugatus* was first reported from the Pacific Ocean (Japan) by De Haan (1833). Stimpson (1858) described a new species, *Portunus strigilis*, from Japan, but only gave a short description without figures. A. Milne-Edwards (1861) found similarities between these two species and pointed out the only

difference is the possition of a small spine on the upper margin of the cheliped palm. However, Miers (1879) commented that *P. corrugatus* and *P. strigilis* are conspecific after examination of specimens from Europe and Japan. Rathbun (1902) treated them as two different species and she noted that the carapace of *Liocarcinus strigilis* is longer and narrower than in *L. corrugatus*; the median frontal tooth is more triangular, with acute tip, its sides forming right angles to laterals, while the sides form an obtuse angle in *L. corrugatus*. Palmer (1927) summarised both opinions by Miers (1879) and Rathbun (1902) and preferred to treat them as two species until more evidence is available. *Liocarcinus strigilis* is not recognised by most workers and normally treated as junior synonym of *L. corrugatus*, but some treat them merely as two forms, one from Europea and the other Asia (see Stephenson & Campbell, 1960; Ng et al., 2008). However, on the basis of molecular data by C. Plagge and S. Klaus working with the author on this matter (unpublished data), the European and Asian *L. corrugatus* are clearly two different species, differing in genetic as well as morphology. Therefore, *L. strigilis* (Stimpson, 1858) should be resurrected and be used for the Asian species, as is done here.

FAMILY PORTUNIDAE RAFINESQUE, 1815

Remarks. – Schubart & Reuschel (2009) elevated two subfamilies (Carcininae and Polybiinae) of the Portunidae Rafinesque, 1815 (sensu Ng et al., 2008) to family level. On the basis of molecular data, Schubart & Reuschel (2009) and Mantelatto et al. (2009) suggested that the Thalamitinae represents a lineage within the Portuninae, and that the current subfamilial system of the

Portunidae needs to be revised. To avoid further confusion and tentatively following these authors, no subfamilies are used in this study.

Genus *Caphyra* Guérin, 1832

Caphyra Guérin, 1832: 285; A. Milne-Edwards, 1873: 172; Nobili, 1901: 11; Nobili, 1906: 188; Leene, 1938: 8; Stephenson, 1972b: 24; Stephenson & Campbell, 1960: 96; Stephenson & Rees, 1968c: 287.

Type species. – *Caphyra rouxii* Guérin, 1832, by monotypy.

Caphyra loevis (A. Milne Edwards, 1869)

Goniosoma loave A. Milne Edwards, 1869: 152.

Caphyra laevis – A. Milne-Edwards, 1873: 173, pl. 4 figs. 2a-c; Stephenson & Campbell, 1960: 97, 100, figs. 1G, 2I, 3D-G, 3J, pl. 3 fig. 3, pl. 5I; Crosnier, 1962: 32, fig. 43 bis a, b; Rees & Stephenson, 1966: 30; Stephenson & Rees, 1968c: 289 (record only); McNeill, 1968: 56 (record only); Stephenson, 1972a (record only); Stephenson, 1972b: 7, 25; Crosnier, 1977: 759, fig. 5l; Cariaso & Garcia, 1968: 183.

Caphyra octodentata Haswell, 1882a: 753; Balss, 1934: 506.

Caphyra semigranosa De Man, 1887: 337.

Caphyra natatrix Zehntner, 1894: 162, pl. 7, fig. 10.

Caphyra suvaensis Edmondson, 1935: 22, fig. 6.

Caphyra loevis – Ng et al., 2008: 147.

Material examined. – None.

Remarks. – This species is associated with soft corals (mostly *Xenia* sp.) and was reported from Madagascar, Australia, New Caledonia, Fiji (e.g., Stephenson, 1972b), as well as from the Philippines by Cariaso & Garcia (1986).

Genus *Carupa* Dana, 1851

Carupa Dana, 1851: 129; Dana, 1852a: 85; Dana, 1852b: 279; Alcock, 1899: 25-26; Leene, 1938: 9; Leene, 1940: 164-165; Sakai, 1939: 373; Stephenson & Campbell, l960: 85, 88; Crosnier, 1962: 17; Stephenson, 1972b: 5 (key), 28; Sakai, 1976: 324-325; Dai & Yang, 1991: 199.

Type species. – *Carupa tenuipes* Dana, 1851, by subsequent monotypy.

Carupa tenuipes Dana, 1852

(Plate 1B)

Carupa tenuipes Dana, 1852: 85; Dana, 1852 b: 279-280, pl. 17 figs 4 a-e; A. Milne Edwards, 1861: 386-387; Alcock & Anderson, 1894 b: 198,201; Klunzinger, 1913: 329; Balss, 1924: 5; Balss, 1934: 505; Leene, 1940: 165, figs 1-2; Stephenson & Campbell, l960: 88, pl. 2 fig. 1; Crosnier, 1962: 19, figs 16-23, pl. 1 fig. 1; Stephenson & Rees, 1967a: 5; Stephenson, 1972a: 130; Stephenson, 1972b: 28; Heath 1973: 1 (key), 3; Sakai, 1976: 325, pl. 110 fig. 3; Stephenson, 1976: 12; Cariaso & Garcia, 1986: 181-182, fig. 1; Dai & Yang, 1991: 199-200, fig. 106, pl. 24 (3); Poupin, 1996 b: 29.

Carupa laeviuscula Heller, 1862: 520; Heller, 1865: 27, pl. 3 fig. 2; De Man, 1888: 336; Alcock, 1899: 26; Borradaile, 1900: 578; De Man, 1902: 642; Nobili, 1906b:

189; Rathbun, 1910: 360; Rathbun, 1911: 210; Ward, 1942: 78; Edmondson, 1954: 226-227, figs 3b, 4e-g.

Carupa laeviscula [sic] – Leene, 1938: 9.

Material examined. – None. One specimen from Panglao (plate 1B) currently under study by T. Naruse & P.K.L. Ng as part of a genus revision.

Remarks. – Widely distributed species (e.g., Madagascar, Arabian Gulf, India, Hawaii, Japan, Australia etc., Apel & Spiridonov, 1998); recorded from the Philippines by Cariaso & Garcia (1986).

Genus *Carupella* Lenz & Strunck, 1914

Carupella Lenz & Strunck, 1914: 278; Barnard, 1950: 146; Crosnier, 1962: 35; Stephenson, 1972b: 8, 30.

Type species. – *Carupella natanensis* Lenz & Strunck, 1914, by monotypy.

Carupella natanensis Lenz & Strunck, 1914

Carupella natatnensis Lenz & Strunck, 1914: 279, pl. 12, figs. 8-16; Barnard, 1950: 147, figs. 28 h-j; Crosnier, 1962: 35, figs. 44-47; Stephenson, 1972: 8 (key), 30 (record only); Moosa, 1981a: 144.

Material examined. – None.

Remarks. – A rare species known from the Philippines based on a single record in Moosa (1981a).

Genus *Catoptrus* A. Milne-Edwards, 1870

Catoptrus A. Milne-Edwards, 1870: 82; Alcock, 1900: 307; Tesch, 1918: 178; Sakai, 1939: 371; Sakai, 1976: 323-324; Edmondson, 1954: 222; Serène, 1966: 993-998; Dai & Yang, 1991: 197.

Goniocaphyra De Man, 1887: 339; Borradaile, 1900: 577; Rathbun, 1906: 870.

Type species. – *Catoptrus nitidus* A. Milne-Edwards, 1870, by monotypy.

Catoptrus marigondonensis Takeda, 2010

Catoptrus marigondonensis Takeda, 2010: 107, figs. 1-4.

Material examined. – None.

Remarks. – This species was originally described from Marigondon Cave, Mactan Island, Philippines (Takeda, 2010), and is presently known only from the type specimens and type locality.

Catoptrus nitidus A. Milne-Edwards, 1870

Catoptrus nitudus A. Milne-Edwards, 1870: 82; Ortmann, 1894: 684; Alcock, 1900: 307; Laurie, 1906: 422; Tesch, 1910: 179, pl. 9, fig. 4; Sakai, 1935: 135, pl. 35 fig.

2; Sakai, 1939: 179, pl. 9; Sakai, 1976: 324, pl. 110, fig. 1; Serène, 1966: 993-994; Chen, 1975: 159, fig. 2, pl. I(3); Cariaso & Garcia, 1986: 182; Dai & Yang, 1991: 197, fig. 105(1), pl. 24(1).

Material examined. – None.

Remarks. – *Catoptrus nitidus* is a wide-ranging species, recorded from the Philippines by Cariaso & Garcia (1986).

Genus *Cavoportunus* Nguyen & Ng, 2010

Cavoportunus Nguyen & Ng, 2010: 39.

Type species. – *Neptunus* (*Achelous*) *dubia* Laurie, 1906 (= *Cavoportunus dubius*), by monotypy.

Diagnosis. – Carapace glabrous, hexagonal in shape, width ca. 1.3 times length; dorsal surface with numerous small granules (fig. 8). Front with 4 sharp small teeth. Anterolateral margin with 9 teeth, first tooth largest, second to ninth teeth smaller, subequal in size. Posterolateral junction of carapace rounded. Male abdomen triangular (fig. 9B). Adult male thoracic sternum with 2 prominent deep depressions on sternite 8, anterior being larger, in which G1 sits (fig. 9A). G1 very short, relatively stout, S-shaped; basal part relatively slender, subdistal part prominently dilated, lobiform; distal part with distinct folds on tip (fig. 9C).

Remarks. – *Cavoportunus* is morphologically closest to *Cycloachelous* Ward, 1942, both genera being characterised by a rounded carapace with low anterolateral teeth all subequal in size. However, *Cavoportunus* can be separated from *Cycloachelous* and all other portunid genera by a very distinctive male first gonopod and a unique structure of the male thoracic sternum (Nguyen & Ng, 2010).

***Cavoportunus dubius* (Laurie, 1906)**

(Figs. 8, 9)

Neptunus (*Achelous*) *dubia* Laurie, 1906: 416, fig. 9.

Portunus (*Achelous*) *dubius* – Stephenson & Rees, 1967: 20, fig 3; Stephenson, 1972a: 135; Stephenson, 1972b: 15, 38; Stephenson, 1976: 16; Moosa, 1981a: 143, 147; Crosnier, 1984b: 401; Crosnier, 1985: 33, figs. 1a-e ; Zarenkov, 1994: 115, Moosa, 1996: 521; Poupin, 1996a: 31; Neumann & Spiridonov, 1999: 19 ; Crosnier, 2002: 404 ; Ng et al., 2008: 151.

Portunus (*Cycloachelous*) *yoronensis* Sakai, 1974: 90; Sakai, 1976: 349, figs. 189a-d; Ng et al., 2008: 151.

Cavoportunus dubius – Nguyen & Ng, 2010: 41, figs. 1-4.

Material examined. – Philippines: 2 males (18.5 × 14.6 mm, 17.4 × 13.3 mm), 1 female (18.5 × 14.3 mm) (ZRC 2001.0627), Bohol, Balicasag I., 50–500 m, tangle nets, 28 Nov. 2001. Additional material. Sri Lanka: Lectotype, male (10.2 × 8.1 mm) (NHM 1907.5.22.320a), Gulf of Manaar, off Negombo, coral reef; 1 male paralectotype (NHM 1907.5.22.320b), same data as for lectotype (specimen broken up in pieces). Ogasawara Is. (Japan): 1 male (14.8 × 11.4

mm), 1 juv. male (9.7 × 7.3 mm), 1 female (13.4 × 10.2 mm) (WMNH-Na-Cr 0539), Wakayama, Kushimoto, Kamiura, 20-30 m, Nov. 1979; 1 female (13.0 × 10.2 mm) (NSMT-KY-08-15), south of Chichi-jima I., 27°03.846′N 142°07.644′E - 27°03.663′N 142°07.869′E, 109-97 m, dredge, coll. RV Koyo, 28 Oct. 2008; 1 juv. male (8.2 × 6.5 mm) (NSMT-KY-08-18), E of Chichi-jima I., 27°05.014′N 142°14.894′E - 27°04.881′N 142°14.865′E, 49-48 m, dredge, coll. RV Koyo, 29 Oct. 2008; 1 juv. male (8.4 × 6.7 mm) (NSMT-KY-08-26), W of Chichi-jima I., 27°04.840′N 142°08.934′E - 27°04.980′N 142°09.151′E, 84-87 m, dredge, coll. RV Koyo, 30 Oct. 2008; 1 juv. male (8.9 × 6.8 mm) (NSMT-KY-09-27), E of Anijima-Seto I., 27°06.292′N 142°13.877′E - 27°06.284′N 142°14.012′E, 81-83.4 m, 50 cm ORI biological dredge, coll. RV Koyo, 15 Jul. 2009; 1 male (12.3 × 9.8 mm), 2 juv. males (9.8 × 7.9 mm, 11.2 × 9.0 mm) (NSMT-SY-09-18), W of Chichi-jima I., 27°06.11′N 142°08.89′E - 27°06.07'N 142°09.06'E, 101-98 m, 50 cm dredge, coll. TRV Shinyo-Maru, 18 Nov. 2009.

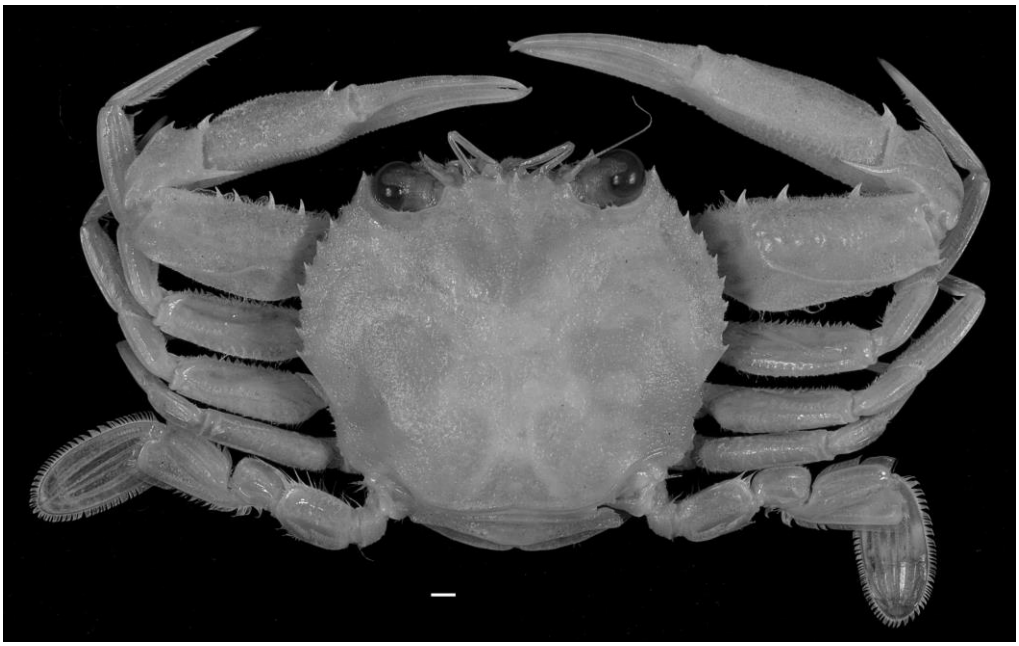


Fig. 8. *Cavoportunus dubius* (Laurie, 1906). Male (18.5 ×14.6 mm) (ZRC 2001.0627). Overall dorsal view. Scale = 1.0 mm.

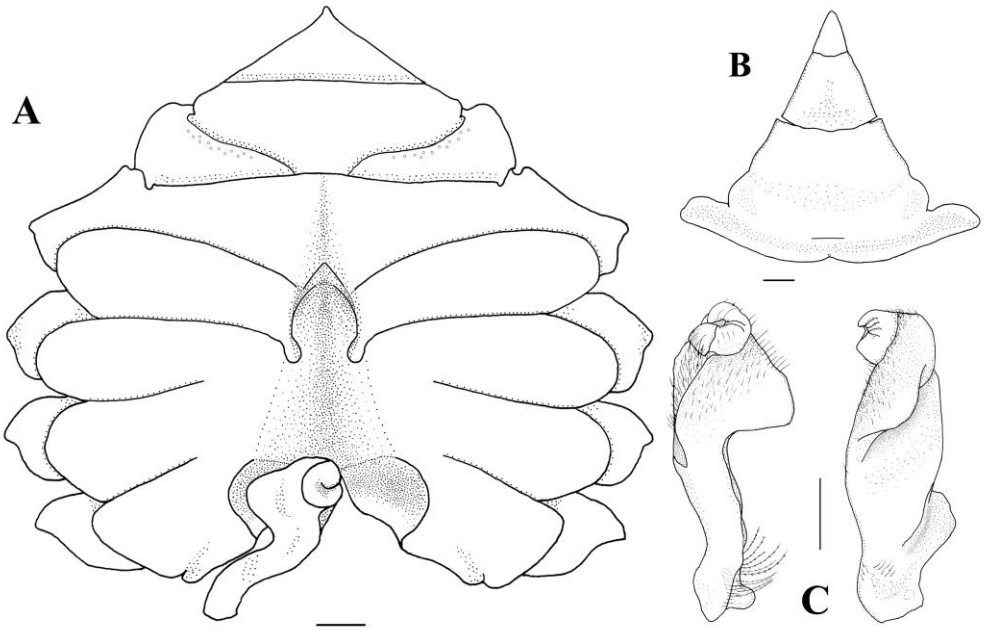


Fig. 9. *Cavoportunus dubius* (Laurie, 1906). Male (18.5 ×14.6 mm) (ZRC 2001.0627). A. Male thoracic sternum with intact right G1; B. Male abdomen; C. Left G1, different views. Scale = 1.0 mm.

Remarks. – Nguyen & Ng (2010) formally synonymised *Portunus* (*Cycloachelous*) *yoronensis* Sakai, 1974 with *Cavoportunus dubius* Laurie, 1906. In fact, Crosnier (1984b) already suggested that *Portunus yoronensis* might be a synonym of *Portunus dubius*, but Ng et al. (2008) retained the name *Portunus yoronensis* out of caution.

Genus *Charybdis* De Haan, 1833

Charybdis De Haan, 1833: 9-10; Rathbun, 1897: 161: Alcock 1899: 47: Leene, 1938: 15: Stephenson et al., 1957: 491: Crosnier, 1962: 73; Holthuis, 1962: 234: Stephenson, 1972b: 30: Sakai, 1976: 354; Wee & Ng, 1995: 12; Apel & Spiridonov, 1998: 183.

Oceanus De Haan, 1833: 10.

Goniosoma A. Milne-Edwards, 1860: 263; A. Milne-Edwards, 1861: 367: Miers, 1886: 189.

Type species. – *Cancer feriatus* Linnaeus, 1758 (= *Charybdis feriatus*), subsequent designated by Glaessner, 1929.

Remarks. – The subgenera classification of genus *Charybdis* was recognised by most experts (i.e., Leene, 1938; Crosnier, 1962; Stephenson, 1972b; Wee & Ng, 1995; Apel & Spiridonov, 1998). I agree with them and continue to follow their system of classification in this thesis.

***Charybdis* (*Charybdis*) *amboinensis* Leene, 1938**

Goniosoma sexdentatum De Man, 1879: 59.

Charybdis (*Charybdis*) *amboinensis* Leene, 1938: 53, figs. 21, 22; Sakai, 1939: 402, pl. 84 fig. 1; Stephenson, 1972a: 131; Stephenson, 1976: 14.

Material examined. – None.

Remarks. – Stephenson (1976) reported one male specimen of *C. amboinensis* from the Albatross Philippines Expedition (1908). The species is recorded from the tropical western Pacific (Indonesia, Philippines) up to Japan.

Charybdis (*Charybdis*) *anisodon* (De Haan, 1850)

Portunus (*Thalamita*) *anisodon* De Haan, 1850: 42.

Charybdis anisodon – Stimpson, 1858: 39; Stimpson, 1907: 80, pl. 2 fig. 1; Rathbun, 1910: 364; Fransen et al., 1997: 104.

Goniosoma anisodon – A. Milne-Edwards, 1861: 381, pl. 33 fig. 4; A. Milne-Edwards, 1873: 167.

Charybdis (*Goniosoma*) *anisodon* – Nobili, 1906b: 198; Estampador, 1959: 69.

Charybdis (*Charybdis*) *anisodon* – Leene, 1938: 64, figs. 29, 30; Leene, 1940: 183; Stephenson et al., 1957: 493, pl. 1 fig. 1; Crosnier, 1962: 81, figs. 141, 142, pl. 4 fig. 1; Sankarankutty, 1966: 356; Stephenson & Rees, 1967a: 8; Türkay, 1971: 133; Stephenson, 1972a: 132; Stephenson, 1972b: 10 (key), 30; Stephenson, 1975: 177; Cariaso & Garcia, 1986: 189, fig. 9; Wee & Ng, 1995: 14, figs. 5A-H; Tirmizi & Kazmi, 1996: 6 (list only); Apel & Spiridonov, 1998: 186; Ng et al., 2008: 153.

Material examined. – None.

Remarks. – This species is wide distributed from Madagascar, Red Sea, China, Taiwan, Japan, the Philippines, Thailand, Malaysia, Indonesia, Australia and New Caledonia (fide Crosnier, 1062, Stephenson et al., 1957; Leene, 1938). Although no specimen was found in the recent expeditions, but this species was reported from Manila Bay, Bohol, Quezon, Palawan, Pangasinan, Masbate and Zambales in the Philippines (Cariaso & Garcia, 1986).

Charybdis (*Charybdis*) *annulata* (Fabricius, 1798)

Portunus annulatus Fabricius, 1798: 364.

Thalamita annulata – H. Milne Edwards, 1834: 463.

Goniosoma annulatum – A. Milne-Edwards, 1861: 374; Hoffmann, 1874: 11.

Goniosoma orientate – HelIer, 1865: 29, pl. 3 fig. 3.

Goniosoma annulatum var. – De Man, 1883: 151 (specimen from Madagascar).

Charybdis (*Goniosoma*) *annulata* – Alcock, 1899: 54; Leene, 1937: 167-168, fig. 1; Chopra & Das, 1938: 393, figs. 4 a-c; Chhapgar, 1957: 22, pl. 6 h-k.

Charybdis annulata – Gordon, 1931: 537, fig. 13; Barnard, 1950: 169, fig. 32h; Vannini, 1976: 121; Kensley, 1981: 42 (list); Kazmi & Kazmi, 1987: 56; Poupin, 1996b: 30; Tirmizi & Kazmi, 1996: 29 (key), 50-52, figs 25 A-E, pl. 2 fig. B.

Charybdis (*Charybdis*) *annulata* – Leene, 1938: 60, figs 26-28; Crosnier, 1962: 78, figs. 136-139, pl. 5 fig. 2; Stephenson, 1972b: 11 (key), 31; Heath, 1973: 2 (key), 3; Sakai, 1976: 356, fig. 192; Stephenson, 1976: 14; Tirmizi, 1981: 107; Tirmizi & Kazmi, 1983: 379; Dai & Yang, 1991: 230, pl. 28(2), fig. 124(1); Hogarth, 1989: 104 (list); Devi, 1993: 536; Wee & Ng, 1995: 17, figs. 6A-H; Apel & Spiridonov, 1998: 187, figs. 10, 11, 16.

(?) *Charybdis annulata* – Zarenkov, 1968: 32.

Not *Charybdis annulata* – Balss, 1938: 32. [= *Charybdis hellerii* A. Milne Edwards, 1867]

Not *Goniosoma annulatum* – De Man, 1883: 151. [= *Charybdis helleri* (*A.* Milne Edwards, 1861)] (fide Leene, 1938: 45).

Not *Goniosoma annulatum* – Henderson 1893: 375.[= *Charybdis callianassa* (Herbst, 1789) (part)] (fide Leene, 1938: 64, 81).

Material examined. – None.

Remarks. – Cariaso & Garcia (1986) reported this species was found in Pangasinan (Philippines).

Charybdis (*Charybdis*) *callianassa* (Herbst, 1789)

Cancer callianassa Herbst, 1801: 45, pl. 54 fig. 7.

Thalamita callianassa – H. Milne Edwards, 1834: 464.

Goniosoma callianassa – A. Milne-Edwards, 1861: 382, 385 (key).

Goniosoma variegatum – Miers, 1879: 33; Miers, 1884a: 232; Henderson, 1893: 376.

Goniosoma annulatum – Henderson, 1893: 375 (part).

Goniosoma variegatum var. *callianassa* – Alcock & Anderson, 1894b: 201.

Charybdis (*Goniosoma*) *callianassa* – Alcock, 1899: 57; Chopra, 1935: 489; Chhapgar, 1957: 421-422, pl. 7 figs. a-c.

Charybdis callianassa – Rathbun, 1910: 364; Stephenson, 1967: 7; Kazmi & Kazmi, 1987: 56; Tirmizi & Kazmi, 1996: 28 (key), 37, figs. 18 A-E.

Charybdis (*Charybdis*) *callianassa* – Leene, 1938: 81, figs. 41-43; Stephenson et al., 1957: 493, figs. 1B-D, 2C, 3D, pl. 1 fig. 2, pl. 4A; Stephenson & Rees, 1967a: 8; Stephenson, 1972a: 132; Stephenson, 1972b: 11 (key), 31; Stephenson, 1975: 177; Stephenson, 1976: 14; Dai & Yang, 1991: 239, pl. 29(5), fig. 130; Wee & Ng, 1995: 21, figs. 8A-E; Apel & Spiridonov, 1998: 190, fig. 12.

Not *Goniosoma variegatum* var. *callianassa* – Henderson, 1893: 376. [= *Charybdis variegata* (Fabricius, 1798)] (fide Leene, 1938).

Not *Charybdis callianassa* – De Man, 1925: 324, fig. 1. [= *C.* (*C.*) *demani* Leene, 1937] (fide Leene, 1937).

Material examined. – None.

Remarks. – This species is widely distributed in the Indo-West Pacific, ranging from India to China and Australia; it was first recorded from the Philippines by Stephenson (1976).

Charybdis (*Charybdis*) *feriata* (Linnaeus, 1758)

Cancer feriatus Linnaeus, 1758: 627.

Cancer sexdentata Herbst, 1783: 153 (part), pl. 8, fig. 53.

Cancer cruciata Herbst, 1789: pl. 38, fig. 1.

Portunus crucifer – Fabricius, 1798: 364.

Goniosoma cruciferum – A. Milne-Edwards, 1861: 371; De Man, 1887: 334; De Man, 1888: 79, pl. 5, fig. 1; De Man, 1895: 559; Lanchester, 1901: 545.

Goniosoma crucifera – Walker, 1887: 110.

Charybdis crucifera – Dana, 1852: 286, pl. 17, figs. l la-c; Stimpson, 1858: 39; Stimpson, 1907: 80; Rathbun, 1907: 80; Kemp, 1918: 250; Balss, 1922: 104.

Charybdis (*Goniosoma*) *crucifera* – Alcock, 1899: 51; Gordon, 1931: 357, fig. 13e; Estampador, 1959: 68.

Charybdis cruciatus – Stebbing, 1902: 9.

Charybdis (*Goniosoma*) *cruciatus* – Chopra, 1935: 482, fig. 7.

Charybdis cruciata - Rathbun, 1910: 363; McNeill, 1929: 149, pl. 37, fig. 5; Shen, 1932: 38, fig. 6, pl. 8; Sakai, 1939: 403, pl. 82, fig. 3; Sakai, 1965: 123, pl. 62, fig. 1; Barnard, 1950: 166, fig. 32a; Takeda & Miyake, 1969: 451.

Charybdis (*Goniosoma*) *cruciata* – Delsman & De Man, 1925: 311; Shen, 1937: 117; Chhapgar, 1957: 419, pl. 5.

Charybdis (*Charybdis*) *cruciata* – Leene, 1938: 24, figs. 1, 2; Leene, 1940: 180; Stephensen, 1946: 114, fig. 24a; Stephenson et al., 1957: 495, figs 2E,3F, pl. 1 fig. 3, pl. 4B; Crosnier, 1962: 75, figs. 130-132; Ow-Yang, 1963: 66, pl. 14, figs. A-F.

Charybdis feriatus – Holthuis, 1962: 234; Campbell & Stephenson, 1970: 273; Lovett, 1981: 128, figs. 281 a-b.

Charybdis (*Charybdis*) *feriatus* – Stephenson & Rees, 1967a: 10; Stephenson, 1967:10; Stephenson, 1972: 132; Stephenson, 1975: 177; Dai et al., 1986: 212, pl. 28(4), fig. 125(1); Dai & Yang, 1991: 232, pl. 28(4), fig. 125(1); Wee & Ng, 1995: 23, figs. 9.

Charybdis (*Charybdis*) *feriata* – Sakai, 1976: 357, p1. 122; Apel & Spiridonov, 1998: 185, 192, pls. 2-3.

Material examined. – Philippines: 1 female (52.3 × 33.6 mm) (ZRC 2001.0629), Bohol, Balicasag Island, 50-500m depth, coll. local fishermen with tangle nets, 28 Nov. 2001.

Remarks. – This is a common species; Estampador (1959) listed this species from Palawan, Luzon, Malabon, Ilocos Sur and Ilocos Norte.

Charybdis* (*Charybdis*) *hawaiensis* Edmondson, 1954

(Plate 1C)

Charybdis hawaiensis Edmondson 1954: 249, figs. 24a-c, 25a-d; Poupin, 1994: 28, pl. 3c.

Charybdis orientalis – Rathbun, 1906: 872 (part., specimen from Honolulu); Edmondson, 1946: 281 [not *C. orientalis* Dana, 1852].

Material examined. – Philippines: 1 female (66.6 × 44.7 mm) (ZRC), Visayas, Bohol, Balicasag I., 200-300 m, tangle nets, coll. local fishermen, Jun. 2002.

Remarks. – The female from Bohol represents the first record of *C. hawaiensis* for the Philippines. Noteworthy, our specimen has four spines on the anterior border of the cheliped manus, whereas the type specimen has only three spines, according to Edmondson (1954). However, Poupin (1994) examined specimens of *C. hawaiensis* from French Polynesia and observed either three or four spines in the species. The colour pattern (including eyes) of the Bohol specimen appears to be very similar to that of the French Polynesian specimen photographed by Poupin (1994).

***Charybdis* (*Charybdis*) *hellerii* (A. Milne-Edwards, 1867)**

Goniosoma Hellerii A. Milne-Edwards, 1867: 282.

Goniosoma annulatum – De Man, 1883: 151. [not *Portunus annulatus* Fabricius, 1798] (fide Leene, 1938: 45).

Goniosoma merguiense De Man, 1888: 82, pl. 5 figs. 3-4; Lenz, 1905: 360; Lenz, 1910: 556; Klunzinger, 1913: 367.

Goniosoma Hellerii – Henderson, 1893: 375.

Charybdis (*Goniosoma*) *merguiense* – Alcock, 1899: 55.

Charybdis (*Goniosoma*) *merguiensis* – Nobili, 1906b: 196; Monod, 1930: 140, fig. 7; Chopra, 1935: 484, text-fig. 8; Chopra & Das, 1938: 394; Leene, 1937: 165; Hashmi, 1963a: 239; Estampador, 1959: 69.

Charybdis (*Charybdis*) *hellerii* – Leene, 1938: 44, figs. 15-17; Stephenson et al., 1957: 497, figs. 1A, 2I, 3, pl. 1 fig. 4, pls. 4C, 5B; Crosnier, 1962: 77, figs. 133-135, pl. V fig. 1; Hashmi, 1963a: 239; Sankarankutty, 1966: 348; Stephenson, 1972a: 132; Stephenson, 1972b: 11 (key), 32; Stephenson, 1976: 14; Dai & Yang, 1991: 233, fig. 126(1), pl. 28(6); Wee & Ng, 1995: 32, figs. 14A-G; Apel & Spiridonov, 1998: 194, figs. 13-15, 17.

Charybdis (*Charybdis*) *lucifera* – Stephensen, 1946: 115. [not *Portunus lucifer* Fabricius, 1798].

Charybdis merguiensis – Barnard, 1950: 168, figs. 27d, 32b; Fourmanoir, 1954: 8, fig. 8; Guinot, 1962c: 6; Kazmi & Kazmi, 1987: 57.

Charybdis hellerii – Edmondson, 1954: 247, figs. 32a-f; Kensley, 1981: 42 (list); Kazmi & Kazmi, 1987: 57; Lemaitre, 1995: 643, fig. 2; Tavares & de Mendonsa, 1996: 151; Tirmizi & Kazmi, 1996: 29 (key), 45, figs. 23A-I, pl. 1 fig. B.

Charybdis helleri. – Guinot, 1962a: 10; Zarenkov, 1968: 3; Heath, 1973: 2 (key), 4; Vannini, 1976: 122, 125; Lanes, 1986: 161, pl. 47; Campos & Türkay, 1989: 119.

Not *Charybdis* (*Goniosoma*) *Hellerii*. – Nobili, 1906b: 195. [= *Charybdis orientalis* Dana, 1852] (fide Leene, 1938: 70).

Not *Goniosoma Hellerii*. – Klunzinger, 1913: 367. [= *Charybdis orientalis* Dana, 1852] (fide Leene, 1938: 70).

Material examined. – None.

Remarks. – Although no specimens of *Charybdis hellerii* were examined in the recent collection, but this species is a common and widely distributed Indo-West Pacific swimming crab and also an invasive species in the Caribbean Sea, Florida, Brazil and Mediterranean Sea (see Lemaitre, 1995; Mantelatto & Dias, 2009; Mantelatto et al., 2009) The record from the Philippines is based on Stephenson (1976).

***Charybdis* (*Charybdis*) *miles* (De Haan, 1835)**

(Plate 1D)

Portunus (*Charybdis*) *miles* De Haan, 1835: 41, pl. 11, fig. 1.

Goniosoma miles – A. Milne-Edwards, 1861: 378; Ortmann, 1893: 81; Whitelegge, 1900: 157.

Charybdis miles – Stimpson, 1858: 39; Stimpson, 1907: 82; Rathbun, 1902: 27; Yokoya, 1933: 175; Sakai, 1939: 405, pl. 46, fig. 2; Sakai, 1965: 123, pl. 61; Takeda & Miyake, 1969: 452.

Charybdis (*Goniosoma*) *miles* – Alcock, 1899: 62; Chopra, 1935: 486, fig. 13; Shen, 1937: 123, fig. 13; Estampador, 1959: 68.

Charybdis (*Charybdis*) *miles* – Leene, 1938: 38, figs. 10; Stephensen, 1946: 116; Stephenson et al., 1957:500, figs. 2H,3I, pl. 2 fig. 3, pl. 4F; Ow-Yang, 1963: 75, pl. 16, figs. A-F; Stephenson & Rees, 1967a: 6; Stephenson & Rees, 1967b: 11; Stephenson & Rees, 1968: 92, figs. 1A, 1E, 2A, pl. 2A; Stephenson, 1972a: 132; Takeda, 1975: 148; Sakai, 1976: 358, pl. 124; Lovett, 1981: 127, figs. 280a-c; Dai et al., 1986: 217, pl. 29(3), fig. 129(1); Dai & Yang, 1991: 237, pl. 29(2), fig. 128(2).

Charybdis (*Gonioneptunus*) *investigatoris* Alcock, 1899: 70.

Material examined. – Philippines: 1 male (27.8 × 20.0 mm) (ZRC), PANGLAO 2004, stn. T9, Panglao Island, off San Isidro; 1 female (22.9 × 16.5 mm) (ZRC), AURORA 2007, stn. CP2723; 3 females (62.1 × 42.8 mm, 56.2 × 40.2 mm; 31.0 × 22.6 mm) (ZRC), AURORA 2007, stn. CP2747; 3 juv. males (18.2 × 13.7 mm, 17.7 × 13.2 mm, 15.7 × 11.6 mm), 1 female (64.9 × 44.4 mm) (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, Dipolog Bay, stn. CP2379, 8°39.9’N, 123°20.2’E, 72–77 m, 28 May 2005.

Remarks. – This is a common species in West-Indo Pacific and the Philippines.

Charybdis (*Charybdis*) *natator* (Herbst, 1794)

(Plate 1D)

Cancer natator Herbst, 1789: pl. 40, fig. 1.

Thalamita natator – H. Milne Edwards, 1834: 463, pl. 17, figs. 13, 14.

Portunus (*Charybdis*) *natator* – De Haan, 1850: 10.

Goniosoma natator - A. Milne-Edwards, 1861: 370; Miers, 1884: 539; Walker, 1887: 110; De Man, 1887: 334; Henderson, 1893: 374; Lanchester, 1901: 544.

Charybdis (*Goniosoma*) *natatrix* – Nobili, 1906: 196.

Charybdis (*Goniosoma*) *natator* – Alcock, 1899: 61; Laurie, 1906: 418; Rathbun, 1910: 364; Balss, 1922: 106; Rathbun, 1923: 131; Delsman & De Man, 1925: 312, pl. 13a; Shen, 1932: 40, figs. 7, 8, pl. 9, fig. 2; Shen, 1937: 125; Estampador, 1959: 68.

Charybdis natator – Sakai, 1939: 407, fig. 9b; Stephenson, 1967: 11.

Charybdis (*Charybdis*) *natator* – Leene, 1938: 93, figs. 50, 51; Stephensen, 1946: 116; Stephenson et al., 1957: 501, figs. 2G, 3H, pl. 2, fig. 4, pl. 4J; Crosnier, 1962: 82, figs. 143, 144, pl. 13, fig. 2; Ow-Yang, 1963: 80, pl. 17, figs. A-F; Stephenson & Rees, 1967a: 6, b:11; Stephenson, 1972: 132; Sakai, 1976: 360, figs. 193a, b, pl. 127, fig. 1; Moosa, 1980: 67, fig. 4B; Lovett, 1981: 128, figs. 283a,b; Miyake, 1983: 89, pl. 30(2); Dai et al., 1986: 214, pl. 28(7), fig. 126(2); Dai & Yang, 1991:234, pl. 28(7), fig. 126(2); Wee & Ng, 1995: 40, figs. 18-21; Apel & Spiridonov, 1998: 201, fig. 28, pl. 5-6.

Material examined. – None.

Remarks. – This widely distributed species has a very distinct colour pattern (Plate 1D). It was previously reported from the Philippines by Estampador (1959).

Charybids (*Charybdis*) *orientalis* Dana, 1852

Charybdis orientalis Dana, 1852: 85.

Charybdis orientalis – Dana, 1852 b: 285, pl. 17 fig. 10; Stebbing, 1918: 50; Sakai, 1939: 407, pl. 83 fig. 2; Barnard, 1950: 170, figs 32 d-g; Guinot, 1962a: 10; Türkay, 1971: 131-132; Vannini, 1976: 126; Kensley, 1981: 42 (list); Kazmi & Kazmi, 1987: 56; Poupin, 1996 b: 31; Tirmizi & Kazmi, 1996: 42-45, figs. 21, 22 A-J, pl. 1 fig. C; Fransen et al., 1997: 105.

Goniosoma orientate – A. Milne-Edwards, 1861: 383, 385; Henderson, 1893: 375.

Goniosoma dubium Hoffmann, 1874: 11, pl. 2 figs. 6-8.

Goniosoma dubium – De Man, 1879: 60; De Man, 1883: 151; Fransen et al., 1997: 105.

Charybdis (*Goniosoma*) *orientalis* – Laurie, 1906: 418; Nobili, 1906b: 195; Chhapgar, 1957: 422, pl. 7.

Charybdis (*Goniosoma*) *helleri* – Nobili, 1906b: 195. [not *Goniosoma Hellerii* A. Milne-Edwards, 1867] (fide Leene 1938: 70).

Charybdis (*Charybdis*) *orientalis* – Leene, 1938: 68, figs. 32-34; Sakai, 1939: 407, pl. 83 fig. 2; Leene, 1940: 183; Stephenson et al., 1957: 502, figs. 2B, 3B, pl. 3 fig. 1, pl. 4G; Crosnier, 1962: 80; Stephenson & Rees, 1967a: 11; Stephenson & Rees, 1967b: 7; Stephenson, 1972a: 133; Stephenson, 1972b: 11 (key), 33; Sakai, 1976: 362, pl. 128 fig. 2; Stephenson, 1976: 14; Tirmizi, 1981: 107; Tirmizi & Kazmi,

1983: 379; Dai & Yang, 1991: 231, pl. 28(3), fig. 124(2); Wee & Ng, 1995: 45, figs. 22A-I; Apel & Spiridonov, 1998: 206, figs. 24, 29.

Not *Goniosoma orientale* – Heller, 1865: 29, pl. 3 fig. 3. [= *Charybdis annulata* (Fabricius, 1798)] (fide De Man 1888: 83 (footnote); Leene, 1938: 69).

Not *Charybdis* (*Goniosoma*) *orientalis* – Alcock, 1899: 63. [= *Thalamita exetastica* Alcock, 1899] (fide Leene, 1938: 69).

Material examined. – None.

Remarks. – The species was originally described based on the material from the Philippines, more precisely Caldera, Mindanao (Dana, 1852).

***Charybdis* (*Charybdis*) *philippinensis* Ward, 1941**

Charybdis philippinensis Ward, 1941: 5, figs. 7, 8.

Charybdis (*Charybdis*) *philippinensis* – Ng et al., 2008: 153.

Charybdis (*Goniohellenus*) *philippinensis* – Ng et al., 2008: 154.

Material examined. – None.

Remarks. – This species, as its name suggests, was originally described from the Philippines, with Davao as the type locality (Ward, 1941). It was accidentally listed twice under two different subgenera (*Charybdis* and *Goniohellenus*) in Ng et al. (2008). Based on its external features, however, *C. philippinensis* clearly belongs to the subgenus *Charybdis*.

Charybdis (*Charybdis*) *riverandersoni* Alcock, 1899

Charybdis (*Goniosoma*) *Rivers-Andersoni* Alcock, 1899: 53.

Charybdis (*Goniosoma) rivers-andersoni* – Alcock & McArdle, 1900: pl. 46 fig. 3.

Charybdis (*Goniosoma*) *rivers-andersoni* – Gordon, 1931: 538 (under remarks on *Charybdis* (*G.*) *barneyl*), fig. 13c.

Charybdis (*Charybdis*) *rivers-andersoni*– Leene, 1938: 28, figs. 3, 4a-b.

Charybdis riversandersoni – Stephenson, 1967: 12; Stephenson & Rees, 1967c: 7; Estampador, 1959: 68; Stephenson & Rees, 1968a: 95, figs. 1B, 1P, 2B, 2D, pl. 12B.

Charybdis (*Charybdis*) *riversandersoni* – Stephenson, 1972b: 11 (key), 33; Apel & Spiridonov, 1998: 208, figs. 26, 27.

Not *Charybdis* (*Charybdis*) *riversandersoni* – Sakai, 1976: 358, pl. 125. [= *C. sagamiensis* Parisi, 1916].

Material examined. – None.

Remarks. – *Charybdis riversandersoni* is a relatively uncommon, deep-water species, reported from the Philippines (Palawan, Luzon) by Estampador (1959).

Charybdis (*Charybdis*) *rufodactylus* Stephenson & Rees, 1968*

Charybdis rufodactylus Stephenson & Rees, 1968a: 102, figs. 1D, H, 2F, pl. 12D; Stephenson, 1972: 11, 34.

Charybdis (*Charybdis*) *rufodactylus* – Moosa, 1995: 519.

Material examined. – Philippines: 1 male (74.5 × 47.2 mm) (ZRC), Visayas, Bohol, Panglao I., Maribohoc Bay, coll: T. J. Arbasto, 100-300m, Nov. 2003 – Apr. 2004; 1 female (92.6 × 60.2 mm) (ZRC), Visayas, Bohol, Balicasag I., 200-300 m, tangle nets, coll. local fishermen, Jun. 2002.

Remarks. – *Charybdis rufodactylus* was previously known only from Australia (Queensland) and French Polynesia (Moosa, 1995). The two specimens from Panglao and Balicasag are here tentatively assigned to *C. rufodactylus* because they differ from the type specimens (cf. Stephenson & Rees, 1968) in the posteriormost anterolateral tooth been curved and directed anterolaterally (vs. straight, as illustrated for the holotype) and the less developed membrane on the G1 tip. These minor differences are most probably part of infraspecific variation of this species.

***Charybdis* (*Charybdis*) *vannamei* Ward, 1941**

Charybdis vannamei Ward, 1941: 4, figs. 5, 6.
Charybdis (*Charybdis*) *vannamei* – Ng et al., 2008: 153.

Material examined. – None.

Remarks. – This poorly known species was originally described from the Philippines, more precisely from Davao (Ward, 1941), and is presently known only from the type-locality.

Charybdis (*Charybdis*) *variegata* (Fabricius, 1798)

Portunus variegatus Fabricius, 1798: 364.

Portunus (*Charybdis*) *variegatus* – De Haan, 1833: pl. 1 fig. 2; De Haan, 1835: 42.

Charybdis variegata – Stimpson, 1858: 39: Stimpson, 1907: 81, pl. 9 fig. 7; Rathbun, 1910: 364; Sakai, 1939: 406, pl. 47 fig. 4; Barnard, 1950: 166 (key), 170, fig. 32c: Stephenson & Rees, 1967c: 10; Kensley, 1981: 42 (list); Tirmizi & Kazmi, 1996: 32, figs. 15, 16A-J, pl. 1 fig. A.

Goniosoma callianassa – A. Milne-Edwards, 1861: 382 (part). [not *Cancer callianassa* Herbst, 1789] (fide Leene 1938: 84).

Goniosoma variegatum var. *callianassa* – Henderson, 1893: 377. [not *Cancer callianassa* Herbst, 1789] (fide Leene 1938: 84).

Charybdis (*Goniosoma*) *variegata* – Alcock, 1899: 60; Nobili, 1906b: 196; Chopra, 1935: 488, figs. 10a-b; Leene, 1937: 169.

Goniosoma variegatum – Klunzinger, 1913: 368.

Charybdis (*Charybdis*) *variegata* – Leene, 1938: 84, figs. 44-45: Stephenson et al., 1957: 503, fig. 3c, pl. 3 fig. 2; Crosnier,1962: 83, fig. 145; Stephenson, 1972a: 133; Stephenson, 1972b: 10 (key), 34; Sakai, 1976: 359, pl. 121 fig. 3; Dai & Yang, 1991: 238, fig. 129(1), pl. 29(3); Devi, 1993: 536; Wee & Ng, 1995: 47, figs. 23A-F; Apel & Spiridonov, 1998: 109, figs. 25, 30.

Charybdis variegata var. *brevispinosa* – Tirmizi & Kazmi, 1983: 370. [not *Charybdis* (*Charybdis*) *brevispinosa* Leene, 1937].

Material examined. – None.

Remarks. – This common species has been reported from Manila, Philippines, by Stephenson (1972a).

Charybdis (*Goniohellenus*) *hongkongensis* Shen, 1934

Charybdis (*Goniohellenus*) *hongkongensis* Shen, 1934: 46, figs. 11,12; Leene, 1938: 110, figs. 61, 62; Stephenson & Rees, 1967b: 3; Stephenson, 1972: 133; Dai et al., 1986: 221, pl. 29(8), fig. 132(1); Dai & Yang, 1991: 242, pl. 29(8), fig. 132(1); Wee & Ng, 1995: 49; figs. 24A-E; Ng et al., 2008: 154.

Material examined. – Philippines: 1 female (14.3 × 10.2 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, W. of Baclayon, stn. T7, 61-62 m, muddy sand, 9°36.1'N, 123°53.3'E, 3 Jun. 2004; 1 male (17.7 × 12.2 mm), PANGLAO 2004, Visayas, Bohol I., Baclayon, stn. T33, 67-74 m, sand with sponges, 9°36.0'N, 123°53.7'E, 3 Jul. 2004; 8 males (37.4 × 24.2 mm – 13.2 × 8.9 mm), 1 ovig. female (29.5 × 19.1 mm), 4 females (no measurement) (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, Dipolog Bay, stn. CP2378, 8°38.8’N, 123°20.1’E, 65 m, 28 May 2005; 4 males, 2 ovig. female (no measurement) (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, Dipolog Bay, stn. CP2378, 8°38.8’N, 123°20.1’E, 65 m, 28 May 2005; 2 males (23.9 × 16.2 mm; 17.1 × 12.3 mm) (ZRC), AURORA 2007, stn. CP2763; 1 female (12.7 × 9 mm) (ZRC), AURORA 2007, stn. CP2764; 1 male (18.9 × 13.1 mm) (ZRC), AURORA 2007, stn. CP2761.

Remarks. – This species was previously reported from the Philippines by Moosa (1981a), which is confirmed by the examination of the present material.

Charybdis (*Goniohellenus*) *ornata* (A. Milne Edwards, 1861)

Goniosoma ornatum A. Milne Edwards, 1861: 376.

Portunus (*Thalamita*) *truncata* – De Haan, 1841: 43, pl. 2, fig. 3 [not *Portunus truncatus* Fabricius, 1798].

Charybdis (*Goniohelenus*) *ornata* – Alcock, 1899: 68, 64; Estampador, 1959: 69.

Charybdis truncata – Stimpson, 1858: 39 [not *Portunus truncatus* Fabricius, 1798].

Material examined. – None.

Remarks. – De Haan (1841) provided figures of Japanese specimens he identified as *Portunus* (*Thalamita*) *truncatus* Fabricius, 1798. However, A. Milne-Edwards (1861) recognised that the species in De Haan (1841) was not *P. truncatus* and established a new species, *Goniosoma ornatum*, based on De Haan's material. Later, *G. ornatum* was synonymised with *Charybdis truncata* (Fabricius, 1798) by Wee & Ng (1995), but was listed again as a valid species in Ng et al. (2008) as some minor differences in the carapace and cheliped features were observed. I follow the cautious approach in Ng et al. (2008) and keep these two nominal species separated until I am able to examine the type specimens of A. Milne Edwards's species. Estampador's (1959) record of *C. ornata* from Luzon, Bataan Province is the only known record of this species from the Philippines.

Charybdis (*Goniohellenus*) *truncata* (Fabricius, 1798)

Portunus truncatus Fabricius, 1798: 365.

Portunus (*Thalamita*) *truncatus* – De Haan, 1835: 43, pl. 12 fig. 3.

Charybdis ornata – Rathbun, 1910: 365 [not *Goniosoma ornatum* A. Milne Edwards, 1861].

Charybdis (*Goniohellenus*) *ornata* – Laurie, 1906: 418.

Charybdis truncata – Stimpson, 1907: 82; Rathbun, 1902: 27; Rathbun, 1923: 133; Sakai, 1939: 412, pl. 45 fig. 4; Sakai, 1965: 122, pl. 59, fig. 3; Stephenson, 1967: 12; Stephenson & Rees, 1968: 292; Takeda, 1989: 152.

Charybdis (*Gonioneptunus*) *truncata* – Borradaile, 1903: 200.

Charybdis (*Goniohellenus*) *truncatus* – Balss, 1922: 103; Yokoya, 1933: 176.

Charybdis (*Goniohellenus*) *truncata* – Shen, 1934: 49, figs. 13, 14; Shen, 1935: 222; Shen, 1937: 127; Leene, 1938: 118, figs. 66, 67; Stephenson et al., 1957: 503, figs. 2D, 3E1, 3E2, pl. 3 fig. 3, pl. 41; Crosnier, 1962: 87, figs. 149, 150, pl. 7 fig. 1; Ow-Yang, 1963: 91, pl. 20, figs. A-G; Stephenson, 1972a: 133; Sakai, 1976: 363, fig. 3, pl. 128; Moosa, 1981a: 145; Lovett, 1981: 128, figs. 285a-b; Dai et al., 1986: 221; Dai & Yang, 1991: 241, pl. 29(8), fig. 132(1); Wee & Ng, 1995: 50, figs. 25A-G.

Material examined. – Philippines: 1 male (31.1 × 21.5 mm) (ZRC), AURORA 2007, stn. CP2762.

Remarks. – This species is closely related to *Charybdis* (*G.*) *hongkongensis* (see Shen 1934 and Ng & Wee, 1995 for a morphological separation of these two species). In the Philippines, it was previously recorded from west coast of Luzon, south of the lighthouse of San Fernando by Moosa (1981a).

Charybdis (*Goniohellenus*) *vadorum* Alcock, 1899

Charybdis (*Goniohellenus*) *hoplites* var. vadorum Alcock, 1899: 67.

Charybdis vadorum Stephenson, 1967: 13.

Goniohellenus vadorum – Serène & Soh, 1976: 16.

Charybdis (*Goniohellenus*) *vadorum* – Chopra, 1935: 493, fig. 13, pl. 9; Shen, 1935: 222; Shen, 1940: 84; Leene, 1938: 114, fig. 63-65; Leene, 1940: 188; Stephensen, 1946: 119; Stephenson & Rees, 1967a: 12; Stephenson, 1972a: 133; Dai et al., 1986: 222, pl. 30(2), fig. 133; Dai & Yang, 1991: 243, pl. 30(2), fig. 133; Wee & Ng, 1995: 53, figs. 26A-H; Apel & Spiridonov, 1998: 185, 220, figs. 37, 38.

Archias sexdentatus Paulson, 1875: 56, pl. 8, figs. 3a, 3b; Nobili, 1906: 198.

Charybdis (*Goniohellenus*) *sinensis* Gordon, 1930: 522; Gordon, 1931: 534, figs. 11, 12c, d, d'; Shen, 1934: 44, figs. 9, 10.

Material examined. – Philippines: 1 male (15.7 × 8.5 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Cortes, stn. T19, 10 – 26 m, mud, 9°42.2'N, 123°50.8'E, 20 Jun. 2004.

Remarks. – Wee & Ng (1995) provided a detailed comparison between this species and *Charybdis* (*Goniohellenus*) *truncata* (Fabricius, 1798). *Charybdis* (*Goniohellenus*) *sinensis* Gordon, 1930, was concluded to be synonym of *C. vadorum* by Chopra (1935). Later, Leene (1938) suggested *Archias sexdentatus* Paulson, 1875, and *C. vadorum* were same species as well.

***Charybdis* (*Gonioneptunus*) *bimaculata* (Miers, 1886)**

Goniosoma variegatum var. *bimaculatum* Miers, 1886: 191, pl. 15, fig.3.

Charybdis (*Gonioneptunus*) *bimaculata* – Shen, 1932: 81, figs. 46 – 47, pl. 4 fig. 3; Leene, 1938: 126, figs. 70 – 71; Stephenson, Hudson & Campbell, 1957: 504, figs.

2J, 3K, pl. 3 fig. 4, pls. 4H, 5A; Stephenson, 1972b: 36; Crosnier & Thomassin, 1974: 1111, fig. 6d; Davie & Short, 1989: 183; Moosa, 1996: 520.

Charybdis (*Goniohellenus*) *bimaculata* – Moosa, 1981a: 145.

Material examined. – Philippines: 1 ovig. female (40.0 × 26.5 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Panglao I., off San Isidro, stn. T10, 117-124 m, mud and fine sand, 9°33.4'/9°33.8'N, 123°49.6'/123°51.5'E, 15 Jun. 2004; 3 males (38.2 × 25.8 mm, 39.9 × 26.2 mm, 38.4 × 25.1 mm), 9 females (38.8 × 25.6 mm, 37.7 × 25.2 mm, 38.7 × 25.2 mm, 34.2 × 21.7 mm, 34.1 × 22.1 mm, 33.3 × 20.5 mm, 31.3 × 20.0 mm, 28.8 × 18.2 mm, 28.8 × 18.2 mm) (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, off Aligbay I., stn. CP2383, 8°44.7’N, 123°18.5’E, 338–351 m, 29 May 2005; 1 female (39.5 × 26.0 mm) (ZRC), AURORA 2007, stn. CP2655.

Remarks. – This species has two small, but conspicuous, red-coloured dots on the mesobranchial region of the carapace, which are visible even in specimens that have been preserved for long time in alcohol. Crosnier & Thomassin (1974) synonymised *C. africana* Shen, 1935, with this species. However, Ng et al. (2008), treated *C. africana* as a valid species. *Charybdis bimaculata* was previously recorded from the Philippines by Moosa (1981a).

Charybdis (*Gonioneptunus*) *padadiana* Ward, 1941

Charybdis padadiana Ward, 1941: 5, figs. 9, 10.

Charybdis (*Charybdis*) *padadiana* – Ng et al., 2008: 153.

Material examined. – None.

Remarks. – This poorly known species was originally described from Davao in the Philippines (Ward, 1941). Ward did not place it in any of the subgenera defined by Leene (1938). Ng et al. (2008) listed *C. padadiana* under the subgenus *Charybdis*. However, according to the original description, "the orbital hiatus is broad and not completely filled by the prolongation of the base of the antenna". Based on this statement, as well as Ward's photographs (Ward, 1941: figs. 9, 10), it seeems more reasonable to place this species in the subgenus *Gonioneptunus* Ortmann, 1894, following the subgeneric definitions in Leene (1938: 18, 19).

Charybdis (*Goniosupradens*) *acutifrons* (De Man, 1879)

Goniosoma acutifrons De Man, 1879: 60; De Man, 1883: 152.

Charybdis (*Goniosoma*) *erythrodactyla* – Delsman & De Man, 1925: 311, pl. 15a; De Man, 1929: 7. [not *Charybdis* (*Goniosupradens*) *erythrodactyla* (Lamarck, 1818)]

Charybdis acitufrons – Leene, 1936: 121, figs. 6-10.

Charybdis (*Goniosupradens*) *acutifrons* – Leene, 1938: 138, figs. 81-84; Sakai, 1976: 365, fig. 195; Crosnier & Thomassin, 1974: 1112, fig. 8a; Cariaso & Garcia, 1986: 204.

Material examined. – None.

Remarks. – This is a rare species was previously recorded from the Philippines (Oriental Mindoro) by Cariaso & Garcia (1986).

Charybdis (*Goniosupradens*) *obtusifrons* Leene, 1937

Charybdis obtusifrons Leene, 1937: 124, fig. 11, 12;

Charybdis (*Goniosupradens*) *obtusifrons* – Leene, 1938: 140, figs. 85-87; Crosnier, 1962: 84, figs. 146, 146 bis a-c, pl. 6 fig. 2; Sakai, 1939: 409, pl. 83 fig. 3; Sakai, 1976: 365, pl. 129 fig. 1; Stephenson, 1976: 15; Dai & Yang, 1991: 240, fig. 131(1), pl. 29(6).

Material examined. – None.

Remarks. – This species was previously recorded from the Philippines (Marina Bay, Quezon, Bohol and Sulu) by Cariaso & Garcia (1986).

Genus *Cycloachelous* Ward, 1942

Cycloachelous Ward, 1942: 79; Nguyen & Ng, 2010: 39 (in text).

Portunus (*Cycloachelous*) – Sakai, 1939: 386; Sakai, 1976: 347; Stephenson & Campbell, 1959: 87 (in text); Davie, 2002: 463.

Type species. – *Lupea granulata* H. Milne Edwards, 1834, by original designation.

Remarks. – Ward (1942) established a new genus, *Cycloachelous*, with *Lupa granulatus* H. Milne Edwards, 1834, as the type species. This genus has not generally recognized by most workers who continue to treat its species as part of *Portunus* (e.g., Stephenson, 1972a, b; Stephenson & Rees, 1967). Davie (2002) following comments by Stephenson & Campbell (1959) on the features

of *Portunus granulatus*, recognises *Cycloachelous* as a valid subgenus of *Portunus*, but only for this species. Ng et al. (2008), however, continued to treat *Cycloachelous* as a synonym of *Achelous*.

Recently, the subgenus *Achelous* was redefined mainly on the basis of molecular data (Mantelatto et al., 2009). In this study, *Achelous* was elevated to the status of a full genus to include 10 American species, six of which were originally placed in the subgenus *Achelous* De Haan, 1833, sensu Ng et al. (2008), including the type species *P. spinimanus* Latreille, 1819, with one species transferred from *Crosnius* Stimpson, 1860, and three from *Portunus* (*Portunus*) Weber, 1795. The American *Portunus* (*Achelous*) *floridanus* Rathbun, 1930, was allied with three species in the subgenus *Portunus* (*Portunus*): *P.* (*P.*) *anceps* (Saussure, 1858), *P.* (*P.*) *hastatus* (Linnaeus, 1767), and *P.* (*P.*) *ventralis* (A. Milne-Edwards, 1879), but their generic status was deemed uncertain. Mantelatto et al. (2009) did not treat the other 16 species and subspecies of *Achelous*, many of which are Indo-Pacific in distribution range. The generic placements of seven other American species previously placed in *Portunus* (*Achelous*): *Portunus* (*Achelous*) *angustus* Rathbun, 1898, *Achelous brevimanus* Faxon, 1895, *Portunus* (*Achelous*) *guaymasensis* Garth & Stephenson, 1966, *Neptunus* (*Hellenus*) *iridescens* (Rathbun, 1894), *Portunus* (*Achelous*) *isolamargaritensis* Türkay, 1968, *Portunus* (*Achelous*) *stanfordi* Rathbun, 1902, and *Achelous tuberculatus* Stimpson, 1860, were not discussed. These are hereby very tentatively retained in *Achelous sensu lato* in the absence of any alternate classification. Neither was the generic and/or subgeneric assignments of the nine Indo-West Pacific taxa discussed: *Neptunus* (*Achelous*) *dubius* Laurie, 1906, *Achelous elongatus* A. Milne Edwards, 1861, *Lupa granulatus* H. Milne Edwards, 1834, *Achelous granulatus unispinosus* Miers, 1884, *Neptunus octodentatus* Gordon, 1938,

Achelous orbicularis Richters, 1880, *Portunus* (*Achelous*) *orbitosinus* Rathbun, 1911, *Portunus* (*Achelous*) *suborbicularis* Stephenson, 1975, and *Portunus* (*Cycloachelous*) *yoronensis* Sakai, 1974. On the basis of their similar carapace shapes and features (rounded carapaces with low anterolateral teeth which are all subequal in size), all the Indo-West Pacific species can be easily referred to *Cycloachelous* Ward, 1942. Davie (2002) have recognized just *Lupa granulatus* in *Cycoachelous*, but kept the related *Portunus orbitosinus* in *Achelous*. It is more parsimonious if both are placed together in *Cycloachelous*.

Cycloachelous granulatus granulatus (H. Milne Edwards, 1834)

Lupea granulata H. Milne Edwards, 1834: 454.

Achelous granulatus – A. Milne-Edwards, 1861: 344; Richters, 1880: 152 (part., see Türkay, 1981); Lenz & Richters 1881: 422; Alcock & Anderson, 1894b: 201.

Neptunus (*Achelous*) *granulatus* – (?) Miers, 1886: 180; Sakai, 1939: 397 (part., fig. 8); Estampador, 1959: 73.

Neptunus granulatus – Alcock, 1899: 45 (part.?).

Portunus (*Achelous*) *granulatus* – Rathbun, 1911: 205, pl. 15, fig. 10.

Cycloachelous granulatus – Ward, 1942: 53 (list), 80, pl. 5, fig. 5; Barnard, 1954a: 124, figs. 3 a-b.

Portunus (*Cycloachelous*) *granulatus* – Sakai, 1976: 348, pl. 120, fig. 2, figs. 187a-b: Tirmizi & Kazmi, 1983: 369.

Portunus granulatus – Stephenson & Campbell, 1959: 108, figs. 2I, 3I, pl. 3 fig. 1, pls. 4I, 5I; Sankarankutty, 1961: 102(list), 104; Stephenson, 1961: 108; Crosnier, 1962: 57, figs. 89, 92, 94a-b; Stephenson & Rees, 1967a: 25 (part., figs. 5c-e); Stephenson & Rees, 1968b: 293; Türkay, 1971: 127; Stephenson, 1972a: 136;

Stephenson, 1972b: 15(key), 39; Heath, 1973: 2(key), 13, figs. 4a, c; Stephenson, 1975: 178, 183; Stephenson, 1976: 16; Vannini, 1976: 125; Kensley, 1981: 42(list); Türkay, 1981: 51; Tirmizi & Ghani, 1982: 105, figs. 1A-F; Dai & Yang, 1991: 211(key), 224, pl. 27(5), fig. 21(1); Poupin, 1996b: 31; Tirmizi & Kazmi, 1996: 23, figs. 10A-F'.

Not *Portunus* (*Achelous*) *granulatus* – Rathbun, 1906: 871, pl. 12, fig. 6; Edmondson, 1954: 239, figs. 16a-b. [= *Portunus suborbicularis* Stephenson, 1975] (fide Stephenson, 1975: 180).

Not *Neptunus* (*Achelous*) *granulatus* – Sakai, 1939: 397 (part., pl. 81, fig. 3) [= *Portunus suborbicularis* Stephenson, 1975] (fide Stephenson, 1975: 180).

Not *Portunus granulatus* – Stephenson & Rees, 1967a: 25 (part., Hawaiian specimens and figs 5a-b) [= *Portunus suborbicularis* Stephenson, 1975] (fide Stephenson, 1975: 180).

Material examined. – None.

Remarks. – *Cycloachelous granulatus* was first reported from Cebu and Mindanao of the Philippines by Estampador (1959).

Cycloachelous orbicularis (Richters, 1880)

Achelous orbicularis Richters, 1880: 153, pl. 16 fig. 14-5; Barnard, 1950: 159, fig. 31a.

Neptunus (*Achelous*) *orbicularis* – Estampador, 1959: 72.

Portunus (*Achelous*) *orbicularis* – Edmondson, 1954: 239, figs. 16c-e, 17b.

Portunus orbicularis – Crosnier, 1962: 58, figs. 95, 99-102.

Cycloachelous orbicularis. – Nguyen & Ng, 2010: 40 (in text), figs. 5A-B.

Material examined. – None.

Remarks. – The only *Cycloachelous orbicularis* record for the Philippines (Mindoro) was reported by Estampador (1959).

Cycloachelous orbitosinus Rathbun, 1911

Portunus (*Achelous*) *orbitosinus* Rathbun, 1911: 205, pl. 15 fig. 11.

Portunus (*Arnphitrite*) *gladiator* – De Haan, 1837: 65, pl. 18 fig. 1. [not *Portunus gladiator* Fabricius, 1798]

Neptunus (*Achelous*) *orbitosinus* – Sakai, 1939: 396, pl. 81 fig. 2; Stephensen, 1946: 120.

Portunus orbitosinus – Stephenson & Campbell, 1959: 113-114, figs 2L, 3L, pl. 3 fig. 4, pls. 4 L, 5L; Stephenson, 1961: 108-109; Crosnier, 1962: 55-57, figs. 88, 90, 91, 93; Stephenson, 1967: 17; Stephenson & Rees, 1967a: 31, fig. 6; Stephenson & Rees, 1968b: 294; Taylor, 1971: 95; Türkay, 1971: 127-128; Zarenkov, 1971: 183; Stephenson, 1972a: 137; Stephenson, 1972b: 15 (key), 41; Stephenson, 1975: 179; Crosnier, 1984a: 398; Crosnier, 1984b: 35; Spiridonov, 1994: 138; Moosa, 1995: 524; Poupin, 1996b: 32; Apel & Spiridonov, 1998: 229, figs. 110-111, 115.

Portunus (*Cycloachelous*) *orbitosinus* – Sakai, 1976: 349, figs. 188a-b.

Portunus cf. *orbitosinus* – Türkay, 1981: 53, figs 22-25.

Material examined. – None.

Remarks. – This species is widely distributed from East Africa to Japan and Australia, encompassing the Philippines. Stephenson & Rees (1967a) recorded this species from Luzon, Cebu, Mindanao and Tawi-Tawi.

Genus *Gonioinfradens* Leene, 1938

Charybdis (*Gonioinfradens*) Leene, 1938: 16.

Type species. – *Charybdis* (*Gonioinfradens*) *paucidentata* (A. Milne Edwards, 1861) (= *Gonioinfradens paucidentatus*), by monotypy.

Gonioinfradens paucidentatus (A. Milne Edwards, 1861)

(Plate 1E)

Goniosoma paucidentatum A. Milne Edwards, 1861: 381, pl. 35 fig. 3.

Thalamita giardi Nobili, 1905: 164.

Charybdis (*Goniosoma*) *giardi* – Nobili, 1906a: 115, pl. V fig. 23, pl. VII fig. 34.

Charybdis paucidentata – Rathbun, 1911: 206; Guinot, 1962a: 10.

Charybdis giardi – Balss, 1924: 3.

Charybdis (*Gonioinfradens*) *paucidentata* – Leene, 1938: 131, figs. 74-76; Stephensen, 1946: 119, 198 (list), 204 (list); Stephenson, 1972b: 10 (key), 36; Sakai, 1976: 366, pl. 130 fig. 1; Basson et al., 1977: 261; Titgen, 1982: 117, 250 (list); Poupin, 1994: 30, fig. 26, pl. 3e; Poupin, 1996a: 34, pl. 16 fig. f; Poupin, 1996b: 31; Apel & Spiridonov, 1998: 223, figs. 40-41, pl. 7.

Thalamita cf. *spinifera* – Apel, 1994: 433 [not *Thalamita spinifera* Borradaile, 1903].

Material examined. – Philippines: 1 male (46.6 × 33.6 mm) (ZRC 2001.0631), Visayas, Bohol, Balicasag I., 50-500 m, tangle nets, coll. local fishermen, 28 Nov. 2001; 1 juv. male (9.2 × 7.1 mm) (ZRC), PANGLAO 2004, Panglao I., Pontod Lagoon 1, stn. B39, 17-25 m, reef wall with small caves, 9°32.8'N, 123°42.1'E, 2 Jul. 2004; 1 male (38.1 × 27.8 mm) (ZRC), Visayas, Bohol, Balicasag I., coll. local fishermen, 2 Mar. 2004; 1 juv. female (28.5 × 20.7 mm) (ZRC), PANGLAO 2004, Pamilacan I., stn. R38, 6-37 m, reef slope, 9°29.4'N, 123°56.0'E, 11 Jun. 2004.

Remarks. – This is a common species ranging from the Red Sea to Central Pacific, including the Philippines (Moosa, 1981a; present material).

Genus *Laleonectes* Manning & Chace, 1990

Laleonectes Manning & Chace, 1990: 50; Ng et al., 2008: 151.

Type species. – *Neptunus vocans* A. Milne Edwards, 1878 (= *Laleonectes vocans*), by original designation.

Laleonectes nipponensis (Sakai, 1938)

(Plate 1F)

Neptunus (*Hellenus*) *nipponensis* Sakai, 1938: 301, fig. 1; pl. 16 fig. 1; Sakai, 1939: 394, fig. 6, pl. 82 fig. 1.

Portunus nipponensis – Serène, 1971: 71, figs. A-D; Stephenson, 1972a: 137; Stephenson, 1972b: 41; Crosnier & Thomassin, 1974: 1106, figs. 5c-d.

Portunus (*Portunus*) *oahuensis* Edmonson, 1954: 243, fig. 20.

Laleonectes nipponensis – Crosnier & Moosa, 2002: 395, figs. 3b, 5d-f ; Ng et al., 2008: 151, fig. 117.

Material examined. – Philippines: 1 male (50.6 × 27.1 mm) (ZRC), Visayas, Bohol, Balicasag I., tangle nets, 200-300 m, coll. local shell fishermen, Jun. 2002.

Remarks. – *Portunus* (*Portunus*) *oahuensis* Edmonson, 1954, is only known by one male shell. I agree with the discussion by Crosnier & Moosa (2002) that *P. oahuensis* is a synonym of *L. nipponenis*. This species is presently known to occur in the western and central Pacific, ranging from Japan and the Philippines to Hawaii.

Genus *Libystes* A. Milne Edwards, 1867

Libystes A. Milne Edwards, 1867: 285; A. Milne-Edwards, 1868: 84; Alcock, 1900: 304; Tesch, 1918: 177; Stephenson & Campbell, 1960: 85; Crosnier, 1962: 13; Serène, 1966: 989; Stephenson, 1972b: 29; Sakai, 1976: 324; Dai & Yang, 1991: 200.

Type species. – Libystes nitidus A. Milne Edwards, 1867, by monotypy.

Libystes nitidus A. Milne Edwards, 1867

Libystes nitidus A. Milne Edwards, 1867: 285; A. Milne-Edwards, 1868: 83, pl. 20, figs. 5-7; Nobili, 1906b: 297; Rathbun, 1906: 830, 834; Laurie, 1915: 463; Tesch,

1918: 177; Stephensen, 1946: 168, figs. 45C-F; Titgen, 1982: 250, 275 (part., specimens from Arabian Gulf); Barnard, 1954b: 99, figs 2 a-e; Stephenson & Campbell, 1960: 86 (key), 252; Crosnier, 1962: 14, figs. 5-10 (part.); Serène, 1966: figs. 1-4 (part); Stephenson, 1972b: 5(key), 29; Titgen, 1982: 250 (list).

Libystes Alphonsi Alcock, 1900: 306; Alcock & McArdle, 1903: pl. 61, fig. 2.

Libystes alphonsi – Stephenson & Campbell, 1960: 86(key).

Material examined. – None. Specimens from the Philippines (PANGLAO 2004 expedition) are currently under study by T. Naruse & P.K.L. Ng.

Remarks. – See material examined above.

***Libystes* cf. *villosus* Rathbun, 1924**

(Plate 1G)

Libystes villosus Rathbun, 1924: 127; Edmondson, 1951: 223, fig. 25; Edmondson, 1954: 226, fig. 4c, d; Miyake & Takeda, 1970: 33, fig. 3.

Libystes cf. *villosus* – Ng et al., 2008: 158, fig. 116.

Material examined. – Philippines: 1 male (ZRC), PANGLAO 2004, Panglao I., lagoon near Dolji Point, stn. R44, 2 m, fine sand with seagrass, 9°33.3'/9°34.6'N, 123°43.9'/123°43.4'E, 14 Jun. 2004.

Remarks. – A specimen from the Philippines was collected by the PANGLAO 2004 expedition (Plate 1G) is currently under study by T. Naruse & P.K.L. Ng.

Genus *Lissocarcinus* Adams & White, 1849

Lissocarcinus Adams & White, 1849: 45; A. Milne-Edwards, 1861: 417; Alcock, 1899: 18; Leene, 1938: 3; Stephenson 1972b: 8(key), 27; Dai & Yang, 1986: 202; Apel & Spiridonov, 1998: 179.

Type species. – *Lissocarcinus polybioides* Adams & White, 1849, by monotypy.

Lissocarcinus arkati Kemp, 1923

(Plate 1H)

Lissocarcinus arkati Kemp, 1923: 405, pl. 10, fig. 1; Chopra, 1931: 310; Gordon, 1931: 533; Leene, 1938: 6; Sakai, 1939: 381, pl. 80, fig. 4; Crosnier, 1962: 23, figs. 28, 32; Stephenson & Cook, 1970: 332; Stephenson, 1972a (record only); Stephenson, 1972b: 8, 27; Moosa, 1981a: 143; Dai & Yang, 1991: 203, fig. 108(1-2), pl. 24(7); Spiridonov, 1999: 65; Ng et al., 2008: 148.

Material examined. – Philippines: 1 male (21.6 × 18.2 mm) (ZRC), PANGLAO 2004, Bohol, Cortes, stn. T18, 80-100 m, mud bottom with sponges, 19 Jun. 2004.

Remarks. – This species is permanently associated with sea urchins (Spiridonov, 1999), mainly of the species *Asteropyga radiata* (A. Anker, pers. comm.). Although *L. arkati* has a wide range in the Indo-West Pacific, being known from Madagascar, India, Philippines, Hong Kong, Japan, Australia,

and Hawaii (Crosnier, 1962; Spridonov, 1999), it seems to be rather uncommon or at least rarely collected.

Lissocarcinus boholensis Semper, 1880

Lissocarcinus boholensis Semper, 1880: 60, 67; Rathbun, 1907: 363; Chopra, 1931: 310; Leene, 1938: 3; Estampador, 1959: 75; Ng et al., 2008: 148.

Material examined. – None.

Remarks. – This species is presently known only from the Philippines with its type locality as Bohol (Semper, 1880) and Vietnam.

Lissocarcinus laevis Miers, 1886

(Plate 2A)

Lissocarcinus laevis Miers, 1886: 205, pl. 17 figs. 3, 3a-b; Alcock, 1899b: 21; Chopra, 1931: 311; Sakai, 1939: 380, pl. 45 fig. 2; Edmondson, 1951: 202; Edmondson, 1954: 230, fig. 7d-f; Estampador; 1959: 75 (record only); Stephenson, 1961: 99, figs. 1C, 2I, pl. 1 fig. 4, pl. 4C; Stephenson, 1972a: (record only); Crosnier, 1962: 27; Ng et al., 2008: 148.

Material examined. – Philippines: 1 ovig. female (11.5 × 9.3 mm) (ZRC), PANGLAO 2004, Bohol, Panglao I., stn. T28, 80 m, muddy sand, 1 Jul. 2004.

Remarks. – *Lissocarcinus laevis* is often associated with sea anemones, both actinians and cerianthids (see Minemizu, 2000). This species is widely distributed in the Indo-Pacific, ranging from South Africa to Japan and Hawaii (Stephenson, 1972a), including the Philippines (Estampador, 1959; present study).

Lissocarcinus orbicularis Dana, 1852

Lissocarcinus orbicularis Dana, 1852b: 288, pl. 18 fig. 1a-3; Alcock, 1899b: 20; Chopra, 1931: 310 (under *L. ornatus*); Barnard, 1950: 145, fig. 28g; Stephenson & Campbell, 1960: 95, pl. 3 fig. 2; Stephenson, 1961: 101, figs. 1D, 3A; Stephenson, 1972a (record only); Stephenson, 1972b: 8, 27; Forest & Guinot, 1961: 27, figs. 15a-b, 16a-c; Crosnier, 1962: 25, figs. 26, 27, 31; Healy & Yaldwyn, 1970: 86, fig. 45; Trott & Garth, 1970: 320; Dai & Yang, 1991: 204, fig. 108(3), pl. 24(8).

Material examined. – Philippines: 1 female (14.7 × 12.6 mm) (ZRC), Visayas, Balicasag I., tangle nets, 200-300 m, coll. local fishermen, Jun. 2002.

Remarks. – This common and wide-spread species is associated with various holothurians (Stephenson, 1972b; Minemizu, 2000) was already known from the Philippines (see Cariaso & Garcia, 1986).

Lissocarcinus polybiodes Adams & White, 1849

(Plate 2B)

Lissocarcinus polybioides Adams & White, 1849: 46, pl. 11 fig. 5; A. Milne-Edwards, 1861: 417; Miers, 1884b: 541; Miers, 1886: 205; Henderson, 1893: 378;

Alcock, 1899: 19; Borradaile, 1903a: 200; Laurie, 1906: 411; Rathbun, 1911: 284; Leene, 1938: 6; Monod, 1938: 113, fig. 9; Sakai, 1939: 379, pl. 43 fig. 3; Stephenson & Campbell, 1960: 94, figs. 1F, 2H, pl. 3 fig. 1, pl. 5H; Crosnier, 1962: 25, figs. 29-30; Zarenkov, 1971: 181; Stephenson, 1972a: 131; Stephenson, 1972b: 8 (key), 27; Sakai, 1976: 327, pl. 111 fig. 5; Spiridonov, 1994: 129; Moosa, 1981a: 144; Moosa, 1995: 517; Apel & Spiridonov, 1998: 180, figs. 7, 9.

Material examined. – Philippines: 1 male (11.2 × 10.6 mm), 1 ovig. female (15.0 × 13.6 mm) (ZRC), PANGLAO 2004, Bohol, West Pamilacan I., stn. T37, 134-190 m, 4 Jul. 2004.

Remarks. – This widely ranging species (East Africa to Australia) was previously known from the Philippines, from Jolo (Moosa, 1981a).

Genus *Lupocyclus* Adams & White, 1849

Lupocyclus Adams & White, 1849: 46; A. Milne-Edwards, 1860: 228; A. Milne-Edwards, 1861: 387; Miers, 1886: 185 (part: not subgenus *Parathranites*); A1cock, 1899: 22; Leene, 1938: 10; Leene, 1940: 168; Barnard, 1950: 147; Stephenson & Campbell, 1960: 107; Crosnier, 1962: 37; Stephenson, 1972b: 9, 37; Dai & Yang, 1991: 210.

Type species. – *Lupocyclus rotundatus* Adams & White, 1849, by monotypy.

Lupocyclus inaequalis (Walker, 1887)

Goniosoma inaequale Walker, 1887: 110, 116, pl. 8, fig. 4

Lupocyclus inaequalis – Stephenson & Campbell, 1960: 108, 111; Stephenson, 1961: 103; Stephenson, 1972a: 134; Stephenson, 1972b: 9, 37; Stephenson, 1976: 15.

Lupocyclus rotundatus – Shen, 1937: 98, fig. 1; Leene, 1940: 169, fig. 3, pl. 1 [not *Lupocyclus rotundatus* Adams & White, 1849].

Lupocyclus granulatus Leene & Buitendijk, 1952: 215, fig. 1a, pl. 16 fig. 1.

Material examined. – None.

Remarks. – Stephenson (1976) recorded this species from Tinakta and Corandangas Islands in the Philippines. It is also known from Singapore, Myanmar, Australia and the Seychelles.

***Lupocyclus philippinensis* Semper, 1880**

(Plate 2C)

Lupocyclus philippinensis Semper, 1880: 68; De Man, 1887: 718; Leene, 1938: 11 (part); Sakai, 1939: 383, pl. 80 fig. 3, figs. 3a-b; Leene, 1940: 174, fig. 5, pl. 3; Leene & Buitendijk, 1952: 214; Stephenson & Campbell, 1960: 109 (key); Crosnier, 1962: 40, figs. 49, 51, 53, 56, 57, pl. 11 fig. 1; Stephenson, 1972a: 134; Stephenson, 1972b: 9 (key), 37; Sakai, 1976: 352, fig. 191; Serène, 1977: 49; Moosa, 1981a: 146, fig. 1; Cariaso & Garcia, 1986: 206, figs. 21a-d; Dai & Yang, 1991: 210, fig. 111(2), pl. 25(6); Moosa, 1995: 520.

Material examined. – Philippines: 1 ovig. female (24.3 × 19.6 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Maribohoc Bay, stn. P2, 9°39.0'N, 123°43.8'E, 400 m, tangle nets, coll. local fishermen, 30 May 2004; 1 male

(25.2 × 19.7 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Panglao I., off San Isidro, stn. T10, 9°33.4'/9°33.8'N, 123°49.6'/123°51.5'E, 117-124 m, mud and fine sand, 15 Jun. 2004; 1 male (25.6 × 21.1 mm), 3 females (25.4 × 20.1 mm; 24.0 × 18.4 mm, 20.0 × 16.6 mm) (ZRC), Visayas, Bohol, Balicasag I., 200-300 m, tangle nets, coll. local fishermen, Jun. 2002

Remarks. – This common species was recorded from the Philippines several times, including in the original description (Semper, 1880), and also by Cariaso & Garcia, 1986).

Lupocyclus rotundatus Adams & White, 1849

Lupocyclus rotundatus Adams & White, 1849: 47, pl. 12 fig. 4; Stephenson & Campbell, 1960: 109, figs. 1K, 2M, pl. 4 figs. 3, 5M; Stephenson, 1961: 102, fig. 3B; Stephenson, 1972a: 134 (record only); Stephenson, 1972b: 9, 37.

Not *Lupocyclus rotundatus* – Leene, 1940 = *L. inaequalis* (Walker, 1887).

Material examined. – None.

Remarks. – The Philippine records of this species are based on Stephenson (1972a); it is also known from Sri Lanka, Japan, and Australia.

Lupocyclus tugelae Barnard, 1950

(Plate 2D)

Lupocyclus tugelae Barnard, 1950: 148, figs. 29a-h; Stephenson, 1961: 103, figs. 1E, 3C, pl. 2 fig. 1; Stephenson, 1972a, 134; Stephenson, 1972b: 9, 37.

Material examined. – Philippines: 1 male (18.1 × 13.2 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Panglao I., Biking, stn. T29, 9°34.5'N, 123°50.6'E, 77-84 m, mud, 1 Jul. 2004.

Remarks. – *Lupocyclus tugelae* is a relatively uncommon species known from East Africa to Australia and the Philippines (Stephenson, 1972b; present study).

Genus *Parathranites* Miers, 1886

Parathranites Miers, 1886: 186; Alcock, 1899: 16; Stephenson & Campbell, 1960: 88; Stephenson, 1961: 97; Crosnier, 1962; 22; Crosnier, 2002b: 800.

Type species. – *Parathranites orientalis* Miers, 1886, by monotypy.

Remarks. – According to Schubart & Reuschel (2009), *Parathranites* may represent a lineage outside the Portunidae sensu Ng et al. (2008). For the time being, however, *Parathranites* will be retained in the Portunidae, awaiting a possible proposition of a new suprageneric taxon for this genus. The genus was revised by Crosnier (2002) which included much of the older PANGLAO material.

Parathranites orientalis (Miers, 1886)

Lupocyclus (*Parathranites*) *orientalis* Miers, 1886: 186 (in part), pl. 17, figs. 1, 1a-c.

Parathranites orientalis – Stebbing, 1920 : 238; Yokoya 1933 : 178; Sakai 1935 : 119, not pl. 32, fig. 2 (= *P*. aff. *tuberogranosus*) ; 1939 : 376, pl. 43, not fig. 2 (= *P*. aff. *tuberogranosus*) ; 1960 : 54, pl. 27, not fig. 6 (= *P*. aff. *tuberogranosus*); 1965: 113, not pl. 51 fig. 1 (= *P*. aff. *tuberogranosus*); 1976: 332, not pl. 113 fig. 3 (= *P*. aff. *tuberogranosus*); Barnard, 1950: 148, figs. 29i, 29l. — Stephenson, 1961: 97, figs. 1B, 2H, pl. 1 fig. 2, pl. 4B; Stephenson, 1972b: 24; Crosnier, 1962: 22, fig. 24; Stephenson & Cook, 1970: 332; Crosnier & Thomassin, 1974: 1098; Dai & Yang, 1984: 188, fig. 110(1), pl. 25(3); Dai & Yang, 1991: 207, fig. 110(1), pl. 25(3); Moosa, 1996: 516 (part); Huang & Yu, 1997: 52 (photograph); Ng et al., 2001: 18; Crosnier, 2002b: 802, figs. 1, 2A, 2B, 4A, 4B, 11A.

Not *Parathranites orientalis* – Alcock, 1899: 17 (= *P. granosus* ?); Rathbun, 1911: 204 (= *P. tuberogranosus* ?); Stephenson & Rees, 1967: 6 (= *P. granosus*); Serène & Lohavanijaya, 1973: 60, pl. 13A (= *P. tuberogranosus* ?); Stephenson, 1972a : 130 [= *P. granosus* or *P. tuberogranosus* ?].

Material examined. – Philippines: 4 males (29.1 × 19.0 mm, 25.4 × 16.9 mm, 21.2 × 13.7 mm, 25.3 × 16.1 mm), 4 females (22.4 × 14.0 mm, 20.7 × 13.4 mm, 21.2 × 13.4 mm, 19.8 × 13.2 mm) (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, Dipolog Bay, stn. CP2380, 8°43.3’N, 123°19.0’E, 259–280 m, 28 May 2005; 1 male (21.0 × 13.3 mm) (ZRC), PANGLAO 2005, Bohol Sea, off Pamilacan I., stn. DW2346, 9°28.4’N, 123°54.5’E, 157–261 m, 24 May 2005; 2 males (20.5 × 13.2 mm; 19.5 × 12.8 mm), 5 females (25.1 × 15.8 mm; 25.2 × 16.0 mm; 19.2 × 13.0 mm; 15.1 × 10.0 mm; 15.7 × 9.7 mm) (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, Dipolog Bay, stn. CP2380, 8°43.3’N, 123°19.0’E, 259–280 m, 28 May 2005.

Remarks. – *Parathranites orientalis* (Mier, 1886) is a widely ranging species (from South Africa to Japan and Tonga) originally described from six specimens from Kai Islands, Indonesia, and one specimen from Admiralty Islands, Papua New Guinea. Crosnier (2002) re-examined the seven syntypes and realised that they belong to two different species. The largest male specimen, for which measurements were provided (Miers, 1886: 187) was selected as lectotype of *P. orientalis*, while the remaining six specimens were assigned to *P. granosus* Crosnier, 2002. In our specimens, the penultimate somite of the male abdomen is slightly more convex than figured by Crosnier (2002: fig. 2B). In all other characters, however, our specimens agree well with *P. orientalis*.

Parathranites granosus **Crosnier, 2002**

(Plate 2E)

Parathranites granosus Crosnier, 2002: 807, figs. 2C-E, 3, 4C.

Lupocyclus (*Parathranites*) *orientalis* – Miers, 1886: 186 (part., not pl. 17, figs. 1, 1a-c = *P. orientalis* (Miers, 1886). [not *P. orientalis* (Miers, 1886)].

Parathranites orientalis – Stephenson & Rees, 1967: 6; Stephenson, 1972a: 130 (part., specimens from Kai); Moosa, 1996: 516 (part.); Crosnier, 2002b: 807, figs. 2C-E, 3, 4C [not *P. orientalis* (Miers, 1886)].

(?) *Parathranites orientalis* – Alcock, 1899: 17 [not *P. orientalis* (Miers, 1886)].

Material examined. – Philippines: 5 males (29.9 × 21.0 mm to 24.2 × 16.9 mm), 17 females (32.2 × 22.4 mm to 20.7 × 14.7 mm) (ZRC), Visayas, Bohol, Panglao I., Maribohoc Bay, coll. T. J. Arbasto, 100-300 m, Nov. 2003 – Apr.

2004; 2 males (21.2 × 14.6 mm, 11.5 × 8.4 mm), 1 female (22.0 × 15.0 mm) (ZRC), PANGLAO 2005, Bohol, off Pamilacan I., stn. DW2346, 9°28.4’N, 123°54.5’E, 157–261 m, 24 May 2005; 1 female (24.4 × 16.7 mm) (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, Dipolog Bay, stn. CP 2380, 8°41.3’N, 123°17.8’E, 150–163 m, 28 May 2005.

Remarks. – This species was originally described based on a type series from the Philippines (Bakun Point, 5°14'50"N 119°58'45"E) and Miers’ (1886) specimens from Kai Islands, Indonesia. It is morphologically very similar to *P. orientalis*, from which it can be distinguished by the presence of the more pronounced granules on the carapace (except on the frontal region); and the lateral margin of the sixth abdominal somite in males is less convex in *P. granosus* than in *P. orientalis*.

***Parathranites tuberogranosus* Crosnier, 2002**

(Plate 2F)

Parathranites tuberogranosus Crosnier, 2002b: 814, figs. 4E, 7A, 8D, 8E, 10A.

Material examined. – Philippines: 43 males (36.5 × 23.5 mm – 25.7 × 26.9 mm), 11 females (31.9 × 21.2 mm – 24.0 × 16.0 mm) (ZRC), Visayas, Bohol, Panglao I., Maribohoc Bay, coll: T. J. Arbasto, 100–300 m, Nov. 2003 - Apr. 2004; 1 male (30.7 × 21.1 mm) (ZRC), PANGLAO 2004, Bohol, Panglao I., Maribohoc Bay, stn. P2, 9°39.0'N, 123°43.8'E, 400 m, tangle nets, local fishermen, 30 May 2004; 1 male (27.0 × 18.3 mm) (ZRC), Visayas,

Bohol, NE coast of Panglao I., coll. T. J. Arbasto & J.C. Mendoza, 12 Dec. 2005; 1 male (11.7 × 8.2 mm) (ZRC), PANGLAO 2004, Visayas, West Pamilacan I., Cervera shoal, stn. T41, 9°29.7'N, 123°50.2'E, 110-112 m, 6 Jul. 2004; 1 male (14.9 × 10.4 mm), 1 female (20.8 × 14.1 mm) (ZRC), PANGLAO 2004, Visayas, West Pamilacan I., Cervera shoal, stn. T36, 9°29.3'N, 123°51.5'E, 95-128 m, sand on echinoderms bed, 4 Jul. 2004.

Remarks. – This species, originally described based on the type material from Balicasag Island (Crosnier, 2002). It differs from *P. tuberosus* by the presence of much larger and less dense granules on the carapace, the fifth anterolateral tooth proportionally being shorter and wider, and the presence of a posterior median tubercle on the cardiac region.

Genus *Podophthalmus* Lamarck, 1801

Podophthalmus Lamarck, 1801: 152; A. Milne Edwards, 1861: 419; Alcock, 1899: 92; Stephenson & Campbell, 1960: 115; Crosnier, 1962: 146; Stephenson, 1972b: 20(key), 53; Sakai, 1976: 382; Tirmizi & Kazmi, 1996: 8.

Type species. – *Podophthalmus spinosus* Lamarck, 1801, by monotypy.

Podophthalmus nacreus Alcock, 1899

Podophthalmus nacreus Alcock, 1899: 93; Alcock & McArdle, 1900: pl. 48 fig. 2; Leene, 1938: 14; Sakai, 1939: 427, pl. 85 fig. 4; Leene, 1940: 179; Sakai, 1965:

127, pl. 65 fig. 1; Zarenkov, 1971: 190; Stephenson, 1972a: 153; Stephenson, 1972b: 53; Crosnier & Thomassin, 1974: 1116, fig. 9b; Moosa, 1981a: 148.

Material examined. – None.

Remarks. – This species ranges from India and Malaysia to Japan and the Philippines (Moosa, 1981a). Števčić (2011) established a new genus, *Vojmirophthalmus* Števčić, 2011, for *Podophthalmus minabensis* Sakai, 1961, a species close to *P. nacreus*. If *Vojmirophthalmus* is accepted as a valid genus, *P. nacreus* may need to be transferred from *Podophthlalmus* to *Vojmirophthalmus* as well in the future.

***Podophthalmus vigil* (Fabricius, 1798)**

Portunus vigil Weber, 1795: 93; Fabricius, 1798: 363.

Podophthalmus spinosus Lamarck, 1801: 152; Desmarest, 1825: 100, pl. 6 fig. 1.

Podophthalmus vigil – Leach, 1815: 149, pl. 118; H. Milne-Edwards, 1834: 467; De Haan, 1835: 44; A. Milne-Edwards, 1861: 420; Miers 1886: 207; Ortmann, 1893: 87; Alcock, 1899: 94; Leene, 1938: 12; Ward, 1942: 82; Stephensen, 1946: 137, figs. 32A-B; Stephenson & Campbell, 1959: 115, figs. 1L, 2O, pl. 5, fig. 1, pl. 5, fig. O; Crosnier, 1962: 146, pl. 13, fig. 1; Hashmi, 1964: 452 (list), 453; Pillai, 1964: 169; Stephenson, 1967: 21; Stephenson & Rees, 1967a: 5, 104; Zarenkov, 1970: 43; Türkay, 1971: 139; Stephenson, 1972a: 153; Stephenson, 1972b: 20 (key), 53; Heath, 1973: 1(key), 13; Sakai, 1976: 383, pl. 135, fig. 2; Kensley, 1981: 42; Moosa, 1981a: 148; Titgen, 1982: 250; Cariaso & Garcia, 1986: 171(key), 238, figs. 44a-d; Dai & Yang, 1991: 261, fig. 141, pl. 32(5); Devi, 1993:

535; Spiridonov, 1994: 148; Gosliner et al., 1996: 236; Tirmizi & Kazmi, 1996: 8, figs. 3A-D.

Material examined. – Philippines: 1 female (40.8 × 18.0 mm) (ZRC), AURORA 2007, stn. CP2762; 4 males, 7 females (ZRC), AURORA 2007, stn. CP2764; 1 male (39.1 × 17.1 mm), 1 female (48.2 × 21.5 mm) (ZRC), AURORA 2007, stn. CP2763; 1 juv. male (ZRC), PANGLAO 2004, Visayas, Bohol, Ubajan, stn. S25, 9°41.5'N, 123°51.0'E, 21 m, mud, 23 Jun. 2004.

Remarks. – *Podophthalmus vigil* is a common and wide-ranging species, known from the Philippines based on several previous records (Estampador, 1959; Moosa, 1981a; Cariaso & Garcia, 1986).

Genus *Portunus* Weber, 1795

Type species. – *Cancer pelagicus* Linnaeus, 1758, designation by Rathbun, 1926.

Remarks. – Alcock (1899) provided descriptions of 5 subgenera. Recently, species of subgenus *Portunus* (*Achelous)* De Haan, 1833 sensu Ng et al. (2008) have been moved to 3 different genera: *Achelous*, *Cycloachelous*, *Cavoportunus* (see detail at remarks part of *Cavoportunus*).

Portunus (*Lupocycloporus*) *gracilimanus* (Stimpson, 1858)

Amphitrite gracilimanus Stimpson, 1858: 38; Stimpson, 1907: 77, pl. 10 fig. 3.

Achelous whitei A. Milne Edwards, 1861: 336, 343, pl. 31 fig. 6.

Neptunus (*Lupocycloporus*) *whitei* – Alcock, 1899: 44.

Neptunus (*Lupocycluporus*) *glacilimanus* – Shen, 1937: 113, figs. 9, 10c; Shen, 1940: 82; Shen 1940a: 221.

Portunus (*Lupocycluporus*) *gracilimanus* – Alcock, 1899: 45; Balss, 1922: 108; Chopra, 1935: 481.

Portunus gracilimanus – Stephenson & Campbell, 1959: 115, figs. 2M, 3M, pl. 4 fig. 1, pls. 4M, 5M; Stephenson, 1972b: 13, 39; Dai et al., 1986: 206, pl. 27(6), fig. 121(2); Dai & Yang, 1991: 225, pl. 27(6), fig. 121(2); Wei & Chen, 1991: 359, fig. 328; Huang & Yu, 1997: 82; Naitanetr, 1998: 72; Ng et al., 2001: 16; Davie & Ng, 2002: 324; Ng & Davie, 2002: 373; Yang et al., 2012: 128, fig. 47, pl. 1(3).

Portunus (*Lupocycloporus*) *gracilimanus* – Shen & Dai, 1964: 51.

Material examined. – None.

Remarks. – *Portunus gracilimanus* is a wide-ranging species previosly reported from the Philippines by Cariaso & Garcia (1986).

***Portunus* (*Lupocycloporus*) *minutus* (Shen, 1937)**

Neptunus (*Lupocycloporus*) *minutus* Shen, 1937: 115, fig. 10.

Portunus minutus – Spiridonov, 1990: 79; Cariaso & Garcia, 1986: 213, fig. 26.

Material examined. – None.

Remarks. – *Portunus minutus* was previosly reported from the Philippines by Cariaso & Garcia (1986), who treated this species as distinct from *P. gracilimanus*, as also did Ng et al. (2008). Stephenson & Campbell (1959) and Spriridonov (1990) had discussed on the synonymy on *P. minutus* and *P. gracilimanus*, and it is clear that the two species are distinct.

***Portunus* (*Portunus*) *pelagicus* (Linnaeus, 1758)**

Cancer pelagicus Linnaeus, 1758: 626; Linnaeus, 1767: 1042.

Cancer pelagicus – Forskål, 1775: 89.

Portunus denticulatus Marion de Procé, 1822: 133.

Cancer cedonulli Herbst, 1794: **2**(5): 157, Pl. 39.

Lupa pelagica – H. Milne-Edwards, 1834: 450; Dana, 1852: 271; Stimpson, 1907: 76.

Neptunus pelagicus – Heller, 1865: 27 (part); Miers, 1884: 229 (part); De Man, 1887: 69; Kemp, 1918: 250.

Neptunus (*Neptunus*) *pelagicus* – Miers, 1886: 173 (part); Alcock, 1899: 31 (key), 34, 35 (part); Parisi, 1916: 171 (part); Balss, 1922: 107; Yokoya, 1933: 177; Sakai, 1934: 303; Sakai, 1935: 128, Pl. 38; Sakai, 1939: 387-388, Pl. 49.

Neptunus peiagicus [sic]: Estampador, 1959: 71.

Portunus (*Portunus*) *pelagicus* var. *sinensis* Shen, 1932: 70, Pl. 3 Fig. 6, Pl. 4 Fig. 2.

Portunus (*Portunus*) *pelagicus* – Serène, 1968: 68 (list); Utinomi, 1969: 87, Pl. 44; Sakai, 1976: 339, Pl. 118; Ng et al., 2008: 152; Lai et al., 2010: 209, figs. 6A, 7A, 8, 9, 10, 20A, 21A, 22A, 23A, 23E, 24A.

Portunus pelagicus – Fabricius, 1798: 367; Rathbun, 1902: 26; Rathbun, 1910a: 313; Rathbun, 1910b: 360, 361; Stephenson & Rees, 1967b: 34–35 (part), Figs. 12c, d, 17b; Stephenson, 1967: 17; 1968a: 386 (part), Fig. 2 C, D; 1972a: 15 key, 41 (checklist); 1972b: 137 (part); Kim, 1973: 355; Takeda, 1982: 148; Miyake, 1983: 84, Pl. 28; Ng, 1998: 1124 (part); Chen, 1989: 353, 355; Dai & Yang, 1991: 212–

213, Fig. 112, Pl. 25(7); Gosliner et al., 1996: 237, colour photograph; Poupin, 1996: 32; Naiyanetr, 1998: 14 (photo), 73 (list); Minemizu, 2000: 234; Ng et al., 2001: 17.

Material examined. – Philippines: 1 female (65.2 × 27.8 mm) (ZRC), PANGLAO 2004, stn. D13, Tagbilaran channel, 2–3 m, sand, 29 Jun. 2004.

Remarks. – Type locality of *Portunus denticulatus* De Procé, 1822, a junior synonym of *P. pelagicus*, is the Philippines. The *Portunus pelagicus* species complex was recently revised by Lai et al. (2010). This study by Lai et al. (2010) synonymised *Cancer cedonulli* Herbst, 1794, under *P. pelagicus*.

***Portunus* (*Portunus*) *pubescens* (Dana, 1852)**

Lupa pubescens Dana, 1852a: 274, pl. 16 fig. 9; Dana, 1852b: 84.

Portunus pubescens. – Rathbun, 1906: 870, pl. 14 fig. 1; Stephenson & Campbell, 1959: 99, figs. 2C, 3C, pl. 1 fig. 3, pls. 4C, 5C; Sankarankutty, 1966: 357, fig. 6, pl. 2 fig 2; Stephenson, Williams & Lance, 1968: 21; Stephenson, 1972a: (record only); Stephenson, 1972b: 15 (key), 42.

Material examined. – None.

Remarks. – This is a widely ranging species known from India, China, Philippines, Japan, Australia and Hawaii.

Portunus (*Portunus*) *sanguinolentus sanguinolentus* (Herbst, 1783)

Cancer sanguinolentus Herbst, 1783: 161, pl. 8 figs. 56, 57.

Portunus sanguinolentus. – Fabricius, 1798: 367; Rathbun, 1906: 870; Stephenson & Campbell, 1959: 98, figs. 2B, 3B, pl. 1 fig. 2, pls. 4 B, 5B; Sankarankutty, 1961: 102 (list), 103; Crosnier, 1962: 45, figs. 59, 62, 63, 68; Guinot, 1962a: 10; Guinot, 1962c: 6; Stephenson, 1967: 18; Stephenson & Rees, 1967a: 45, figs. 12a-b; Stephenson & Rees, 1967b: 17; Stephenson 1968a: 368, fig. 2B; Stephenson et al., 1968: 21; Türkay, 1971: 123; Heath 1973: 2 (key), 14, fig. 3; Sakai, 1976: 337 (key), 338, pl. 117; Vannini, 1976: 126; Dai & Yang, 1991: 213, pl. 25(8), fig. 113(1); Devi, 1993: 536; Poupin, 1994: 31, fig. 27, pl. 3f; Poupin, 1996b: 32; Tirmizi & Kazmi, 1996: 1618, figs. 6A-F.

Lupa sanguinolentus – H. Milne-Edwards, 1834: 451; Barnard, 1950: 154.

Portunus (*Neptunus*) *sanguinolentus* – De Haan, 1835: 38.

Neptunus sanguinolentus – A. Milne-Edwards, 1861: 319; Lanchester, 1900: 745; Nobili, 1906a: 114; Lenz, 1910: 556; Sakai, 1939: 387, pl. 48 fig. 1; Estampador, 1959: 72.

Neptunus (*Neptunus*) *sanguinolentus* – Miers, 1886: 174; Alcock, 1899: 32; Nobili, 1901: 9; Chopra, 1935: 474, fig. 2; Chopra & Das, 1938: 391; Stephensen, 1946: 123, fig. 26D; Chhapgar, 1957: 18, pl. 4m-o, pl. A3; Hashmi, 1963a: 239; Hashmi, 1963b: 115, 117.

Portunus sanguinolentus sanguinolentus – Stephenson, 1972a: 138; Stephenson, 1972b: 15 (key), 42; Stephenson, 1976: 19.

Portunus (*Portunus*) *sanguinolentus* – Sakai, 1976: 338, pl. 117; Tirmizi & Kazmi, 1983: 369.

Portunus (*Portunus*) *sanguinolentus sanguinolentus* – Ng et al., 2008: 152.

Material examined. – None.

Remarks. – This is a widely ranging Indo-Pacific species known from the Philippines based on several records.

Portunus (*Xiphonectes*) *subtilis* sp. nov.*

Portunus hastatoides – Sakai 1939: 391, pl. 47 fig. 1; Stephenson & Campbell, 1959: 101, figs 2D, 3D, pl. 1 fig. 4, pl.4 figs 4D, 5D; Dai & Yang, 1991: 212 (key), 216, pl. 26(3), fig. 114(2); Yang et al., 2012: 139, fig. 52, pl. IX fig. 2. [not *Portunus hastatoides* Fabricius, 1798].

Material examined. – Philippines: 1 male (34.6 × 18.2 mm), 1 ovig. female (35.4 × 17.7 mm), 1 female (32.5 × 16 mm) (ZRC), AURORA 2007, stn. CP2764.

Diagnosis. – See Chapter 4.

Remarks. – This new species is part of the *Portunus hastatoides* Fabricius, 1798 complex, which is discussed in detail in Chapter 4.

Portunus (*Xiphonectes*) *brockii* (De Man, 1887)

Neptunus brockii De Man, 1887a: 328, pl. xiii fig. 4.

Neptunus (*Hellenus*) *brockii* – Alcock, 1899: 43; Shen, 1937: 111, figs. 7, 8e, 8f.

Portunus brocki – Stephenson & Campbell, 1959: 106, figs. 2G, 3G, pl. 2 fg. 3, pls. 4G, 5G.

Portunus brockii – Stephenson & Rees, 1967a: 19; Stephenson, 1972: 8 (record only); Stephenson, 1972b: 13, 38.

Material examined. – Philippines: 1 juv. male (ZRC), PANGLAO 2004, Panglao I., Doljo point, stn. M51, reef platform and wall, giant seafans in 40-60 m, 30 Jun. 2004.

Remarks. – This species is known from the eastern Indian Ocean (Andaman Islands) and western Pacific (Indonesia, Singapore, Philippines and Australia). The record from the Philippines is based on Stephenson (1972b).

***Portunus* (*Xiphonectes*) *iranjae* Crosnier, 1962**

(Fig. 10, plate 2G)

Portunus iranjae Crosnier, 1962: 61, figs 107, 110-111, 115, 118-119, pl. 4(2); Stephenson & Rees, 1967a: 30; Stephenson, 1972b: 14, 40; Stephenson, 1975: 178; Stephenson, 1976: 18; Chen, 1980: 132, fig. 15, pl. IV(6); Dai & Yang, 1991: 216, fig. 115, pl. 26(4); Spiridonov, 1999: 79; Vannini & Innocenti, 2000: 264, fig. 79; Yang et al., 2012: 143, fig. 52, pl. IX(2).

Material examined. – Philippines: 1 male (21.6 × 10.3 mm), 1 female (22.0 × 10.5 mm), 1 ovig. female (20.4 × 10.0 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Balicasag I., stn. M58, intertidal, 4 Jul. 2004; 1 juv. female (12.5 × 5.8 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Balicasag I., stn. S3, 6 m, edge of reef platform, 4 Jun. 2004.

Remarks. – This is a widely distributed species ranging from East Africa (Tanzania, Somalia) and Madagascar to China and French Polynesia, including the Philippines (Stephenson, 1972b; present study).

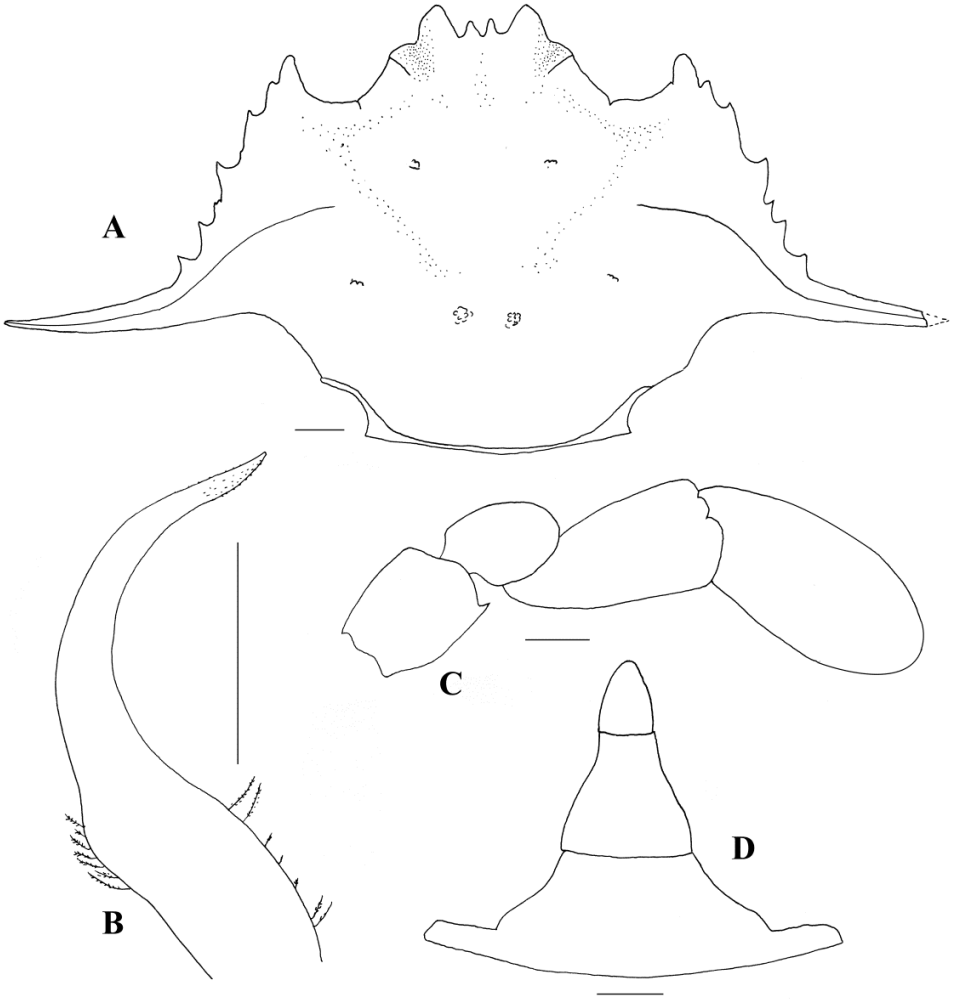


Fig. 10. *Portunus* (*Xiphonectes*) *iranjae* Crosnier, 1962. Male (21.6 × 10.3 mm), Panglao stn. M58. A. Carapace; B. G1; C. Right natatory leg; D. Abdomen. Scale = 1.0 mm.

***Portunus* (*Xiphonectes*) *macrophthalmus* Rathbun, 1906**

(Plate 2H)

Portunus (*Xiphonectes*) *macrophthalmus* Rathbun, 1906 : 871, fig. 31, pl. 12 fig. 5;

Edmonson, 1954: 242, figs. 18d-f, 19b.

Portunus macrophthalmus – Stephenson & Rees, 1967a: 30; Stephenson, Williams & Lance, 1968: 21; Stephenson, 1972a: 137 (record only); Poupin, 1996a: 32; Crosnier, 2002a: 410.

Portunus iranjae – Poupin 1996a: 32 (part., specimen Tahuat) [not *Portunus iranjae* Crosnier, 1962].

Material examined. – Philippines: 1 female (15.7 × 6.4 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Panglao I., SE of Dauis, stn. D1, 2 m, muddy coarse sand with rubble, 3 Jun. 2004; 1 male (22.3 × 9.7 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Balicasag I., stn. M58, intertidal, 4 Jul. 2004; 1 male (15.8 × 6.8 mm) (ZRC), PANGLAO 2004, Visayas, Bohol, Balicasag I., stn. S3, 6 m, edge of reef platform, 4 Jun. 2004.

Remarks. – This species is known from Mauritus to Hawaii and was previously reported from the Philippines by Stephenson (1972b).

***Portunus* (*Xiphonectes*) *pulchricristatus* (Gordon, 1931)**

(Plate 3A)

Neptunus (*Hellenus*) *spinipes* Alcock, 1899: 31, 39. [not *Neptunus* (*Amphitrite*) *spinipes* Miers, 1886: 178, pl. 15 fig. 1]

Neptunus (*Hellenus*) *pulchricristatus* Gordon, 1931: 534, figs. 8, 10a.

Portunus pulchricristatus – Stephenson & Rees, 1967a: 35, figs. 7a-c; Stephenson & Rees, 1967b: 16; Stephenson, 1972a: 138; Stephenson, 1972b: 15 (key), 42; Stephenson, 1975: 179; Dai & Yang, 1991: 217, pl. 26(5), fig. 116(1-2); Ghani &

Tirmizi, 1993: 69, figs. 1, 2 A-D'; Tirmizi & Kazmi, 1996: 25, figs. 11, 12A-D; Yang et al., 2012: 154, fig. 57, pl. II(1).

Material examined. – Philippines: 1 male (27.8 × 12.5 mm) (ZRC), PANGLAO 2004, Bohol Island, Cortes, stn. 20, mud, 44-59 m, 20 Jun. 2004; 1 male (23.1 × 10.1 mm) (ZRC), PANGLAO 2004, Bohol Island, Cortes, stn. T19, 10-26 m, mud, 20 Jun. 2004; 1 male (20.5 × 9.3 mm) (ZRC), PANGLAO 2004, Bohol Island, West of Baclayon, stn. T7, 61-62 m, muddy fine sand, 3 Jun. 2004; 1 juv. male (13.1 × 5.2 mm), 1 female (25.0 × 10.3 mm), 1 ovig. female (17.8 × 7.6 mm) (ZRC), PANGLAO 2004, Bohol Island, Ubajan, stn. S25, 21 m, mud, 23 Jun. 2004; 9 males, 6 females (ZRC), AURORA 2007, stn. CP2764.

Remarks. – *Portunus pulchricristatus* is widely distributed in the Indian Ocean (Oman, India, Myanmar), as well as the western Pacific (Philippines, China) (Stephenson, 1972b).

***Portunus* (*Xiphonectes*) *rugosus* (A. Milne Edwards, 1861)**

Neptunus rugosus A. Milne Edwards, 1861: 335, pl. 33, fig. 3.

Neptunus (*Amphitrite*) *rugosus* – Miers, 1886: 176; Estampador, 1959: 73.

Portunus rugosus – Stephenson, 1961: 111, figs. 2B, 3G, pl. 3 fig. 1, pls. 4G, 5E; Stephenson & Rees, 1967a: 37, figs. 8-11, pls. 3B, 4-5; Stephenson, 1972a: 138; Stephenson, 1972b: 42.

Material examined. – None.

Remarks. – This species is widely distributed in the western Pacific, from the Philippines to Malaysia, New Caledonia and Australia (Estampador, 1959; Stephenson, 1972b, Davie, 2002).

Portunus (*Xiphonectes*) *spinipes* (Miers, 1886)

Neptunus (*Amphitrite*) *spinipes* Miers, 1886: 175, pl. 15 figs. 1 a-c; Estampador, 1959: 73.

Portunus spinipes – Stephenson & Rees, 1967a: 48, fig. 14; Stephenson, 1972a: 139; Stephenson, 1972b: 15, 43.

Not *Neptunus* (*Heltenus*) *spinipes*. – Alcock, 1899: 32 (key), 39-40. [= *Portunus pulchicristatus* (Gordon, 1931)]

Material examined. – None.

Remarks. – This species is distributed mainly in the Indo-Malayan Archipelago and the Philippines (Estampador, 1959; Stephenson, 1972b).

Portunus (*Xiphonectes*) *spiniferus* Stephenson & Rees, 1967

(Fig. 11, plate 3B)

Portunus spiniferus Stephenson & Rees, 1967a: 46, fig. 13, pl. 6A; Stephenson, 1972a: 141 (in text); Stephenson, 1972b: 13 (record only).

Portunus tridentatus Yang et al., 1979: 80, fig. 4, pl. I fig. 4; Dai et al., 1986: 201, fig. 118(2), pl. 27(1); Dai & Yang, 1991: 221, fig. 118(2), pl. 27(1); Yang et al., 2012: 163, fig. 61, pl. IX fig. 6.

Material examined. – Philippines: 1 ovig. female (32.7 × 17.8 mm) (ZRC), PANGLAO 2004, Pamilacan I., stn. S10, 6-14 m, coral plateau with fine sand covering rocks, 11 Jun. 2004; 1 male (44.3 × 20.8 mm), 1 female (29.8 × 13.9 mm) (ZRC), PANGLAO 2004, Bohol Island, Cortes Takot, stn. S15, 4-6 m, coral plateau, 16 Jun. 2004; 1 female (42.9 × 22.0 mm) (ZRC), PANGLAO 2004, Panglao I., Pontod Islet, stn. D5, 0-3 m, soft bottom with seagrass; 2 males (34.5 × 17.0 mm, 27.9 × 13.9 mm), 1 female (31.8 × 16.6 mm), 1 juv. (18.9 × 8.5 mm) (ZRC), PANGLAO 2004, Pamilacan I. stn.S12, 6-8 m, coral plateau with fine sand, 14 Jun. 2004; 1 female (29.8 × 13.8 mm) (ZRC), PANGLAO 2004, Panglao I., Alona reef, stn. R3, 5-24 m, base of reef slope, May–Jun. 2004; 1 juv. male (8.5 × 4.2 mm) (ZRC), PANGLAO 2004, Pamilacan Island, stn. S22, 15-20 m, hard ground covered with sand, 21 Jun. 2004; 1 juv. male (13.2 × 6.5 mm) (ZRC), PANGLAO 2004, Bohol I., Ubajan, stn. S26, 21 m, mud, 21 Jun. 2004; 1 juv. male (16.8 × 7.5 mm) (ZRC), PANGLAO 2004, Panglao Island, Doljo Point, stn. M5, 0-2 m, mixed intertidal platform, fringe mangove, seagrass May-Jun. 2004.

Remarks. – *Portunus spiniferus* was originally described from the Philippines and is also known from China (Stephenson & Rees, 1967; Dai & Yang, 1991). The Panglao specimens agree well with Stephenson & Rees's (1967) description and figures. The carapace of this species is characterised by the

shape of the frontal teeth and the anterolateral margin and median postcardiac region having conspicuous spines.

Yang et al. (1979) described *Portunus tridentatus* Yang, Dai & Song, 1979, from Xisha Islands, in the South-China Sea. These authors compared their species with *P. tenuipes* (De Haan, 1853), *P. rugosus* (A. Milne Edwards, 1861), *P. alcocki* (Nobili, 1905), *P. tweediei* (Shen, 1937),

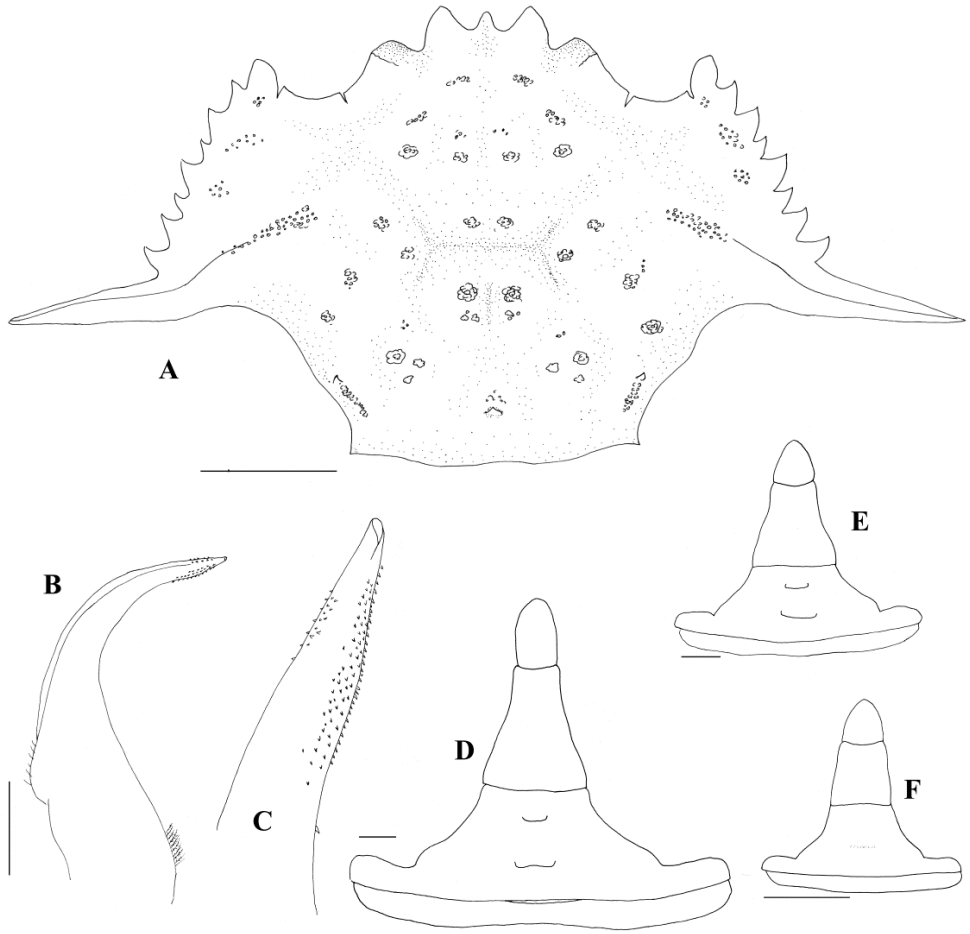


Fig. 11. *Portunus* (*Xiphonectes*) *spiniferus* Stephenson & Rees, 1967. A, E. Male (34.5 × 17 mm), Panglao 2004, stn. S12; B, C, D. Male (44.3 × 20.8 mm), Panglao stn. S15; F. Juv. male (8.5 × 4.2), Panglao stn. S22. A. Carapace; B. G1; C. Same, tip; D, E, F. Male abdomen of three different specimens. Scale = 1.0 mm.

P. mariei Guinot, 1957, but not with *P. spiniferus*. Yang et al. (1979, 2012) provided a detailed description, figures and photographs of the type specimens of *P. tridentatus*, which agree with *P. spiniferus* in most important characters,

including the carapace shape, presence of a distinct postcardiac spine, and features on the third maxiliped, chelipeds, natatory leg, and G1. The only difference appears to be on the sixth somite of the male abdomen, which in *P. tridentatus* is slightly longer than in *P. spiniferus* (cf. Yang et al., 1979: fig. 118(2) and Stephenson & Rees, 1967: fig. 13c). This difference is most likely related to the size of the type specimens: those of *P. tridentatus* are large males (53.3 × 24.5 mm; 50.5 × 23.3 mm), whereas those of *P. spiniferus* are much smaller males, with a carapace width range 23–28 mm. The carapace width of the Panglao male specimens ranges from 8.5 mm to 44.3 mm; in these specimens, the sixth abdominal somite is indeed longer in larger specimens compared to smaller ones. Therefore, *P. tridentatus* is hereby placed in the synonymy of *P. spiniferus*.

***Portunus* (*Xiphonectes*) *stephensoni* Moosa, 1981**

Portunus emarginatus Stephenson & Campbell, 1959: 107, figs. 2H, 3H, pl. 2 fig. 4, pls. 4H, 5H. [name preoccupied]

Portunus stephensoni Moosa, 1981b: 108 [replacement name for *Portunus emarginatus* Stephenson & Carnpbell, 1959].

Portunus emarginatus – Sankarankutty, 1961: 103; Crosnier, 1962: 66, figs. 108, 112-114, 116, 120-121; Stephenson & Rees, 1967a: 30; Türkay, 1971: 126; Stephenson, 1972a: 135; Stephenson, 1972b: 14 (key), 39.

Not *Portunus emarginatus* Leach, 1814: 390. [= *Macropipus arcuatus* (Leach, 1814)]

Material examined. – Philippines: 1 female (27.7 × 12.8 mm) (ZRC), PANGLAO 2004, Tagbilaran channel, stn. D13, 2–3 m, sand, 29 Jun. 2004.

Remarks. – Moosa (1981b) chose the name *P. stephensoni* as the replacement name for *P. emarginatus* Stephenson & Campbell, 1959, since the latter name is preoccupied by *Portunus emarginatus* Leach, 1814 [= *Macropipus arcuatus* (Leach, 1814)].

***Portunus* (*Xiphonectes*) *tenuicaudatus* Stephenson, 1961**

Portunus tenuicaudatus Stephenson, 1961: 114, figs. 2C, 3H, pl. 3 fig. 2, pls. 4H, 5C; Stephenson & Rees, 1967a: 31; Stephenson, 1972b: 43.

Material examined. – None.

Remarks. – This species has been reported to be found in Philippines by Stephenson (1972b).

***Portunus* (*Xiphonectes*) *tenuipes* (De Haan, 1835)**

Amphitrite tenuipes De Haan, 1835: 39, pl. 1 fig 4.

Neptunus (*Amphitrite*) *tenuipes* – Sakai, 1939: 389, pl. 80 fig. 2; Estampador, 1959: 73.

Portunus tenuipes – Stephenson & Campbell, 1959: 103, figs. 2E, 3E, pl. 2 fig. 1, pls. 4E, 5E; Stephenson & Rees, 1967a: 49, fig. 15; McNeill, 1968: 55 (record only); Stephenson, 1972b: 43.

Material examined. – None.

Remarks. – Estampador (1959) recorded this species from Cebu, the Phillippines.

Portunus (*Xiphonectes*) *trilobatus* Stephenson, 1972

Portunus trilobatus Stephenson, 1972: 139-141, figs. 1, 2; Moosa, 1981a: 147.

Material examined. – None.

Remarks. – Stephenson (1972a) listed specimens from Manila Bay, Philippines as materials in the paper describing species *P. trilobatus*. This species was also recorded from the Phillipines by Moosa (1981a).

Portunus (*Xiphonectes*) *tuberculosus* (A. Milne Edwards, 1861)

Neptunus tuberculosus A. Milne Edwards, 1861: 333, 339 (key), pl. 31 figs 5, 5a-c. [erroneously marked as *Neptunus rugosus* on the plate]

Neptunus (*Amphitrite*) *tuberculosus* – Miers, 1886: 176.

Neptunus tuberculosus – Henderson, 1893: 369.

Neptunus (*Hellenus*) *tuberculosus* – Alcock 1899: 42-43; Borradaile, 1903 a: 208; Stephensen, 1946: 123.

Portunus tuberculosus – Stephenson & Campbell, 1959: 89 (key); Crosnier, 1962: 69, figs 97-98, 124-127; Stephenson & Rees, 1967a: 52, fig. 18, pl. 6B; Stephenson, 1972a: 52, figs. 18a-c, pl. 6B; Stephenson, 1972b: 14 (key), 44; Heath, 1973: 2

(key), 14, figs 5b-c; Dai & Yang, 1991: 211 (key), 218, fig. 116(3), pl. 26(6); Spiridonov, 1994: 140.

Material examined. – Philippines: 1 male (16.9 × 9.9 mm) (ZRC), PANGLAO 2004, Bohol I., Baclayon, stn. T32, 60-62 m, muddy sand, 3 Jul. 2004.

Remarks. – Moosa (1981a) found this species from these locations: Western Luzon, south of the lighthouse of San Fernando, off southern Luzon China Sea; also to Tinakta Islands Tawi Tawi group, Sulu archipelago, Mindanao, Palau, north-east Ngabadongu.

***Portunus* (*Xiphonectes*) *unidens* (Laurie, 1906)**

Neptunus (*Hellenus*) *hastatoides* var. *unidens* Laurie, 1906: 414.

Neptunus (*Hellenus*) *tweediei* Shen, 1937: 109, figs. 6, 8c, 8d.

Material examined. – Philippines: 1 male (17.3 × 7.7 mm) (ZRC), PANGLAO 2004, Bohol Island, Cortes, 10-26 m, stn. T19, mud, 20 Jun. 2004; 1 juv. male (14.7 × 5.9 mm) (ZRC), PANGLAO 2004, Bohol Island, Ubajan, stn. S25, 21 m, mud, 23 Jun. 2004; 2 juv. males (13 × 4.6 mm; 10.3 × 3.6 mm) (ZRC), PANGLAO 2004, Bohol Island, Ubajan, stn. S25, 21 m, mud, 23 Jun. 2004.

Remarks. – The author has revised *P. unidens* (Laurie, 1906) as part of his work on the *Portunus hastatoides* species complex (see Chapter 4 of this thesis), and recognised this as a valid species (previously regarded as a synonym of *P. hastatoides* Fabricius, 1798). In this study, *P. tweediei* (Shen,

1937) was found to be a junior synomym of *P. unidens*. Records of *P. tweediei* in the Philippines can be found in Stephenson (1972b).

Portunus (*Monomia*) *argentatus argentatus* (A. Milne Edwards, 1861)

Amphitrite argentata White, 1847: 146 (nomen nudum)

Neptunus argentatus Milne Edwards, 1861: 332, pl. 31, figs. 4, 4a-b.

Portunus argentatus - Stephenson, 1961: 105, figs. 1F, 3D, pl. 2 fig. 2, 4D, 5A; Crosnier, 1962: 50, figs. 71, 75, 77, 80, 81, pl. 3 fig. 1; Stephenson & Rees, 1967a: 16, fig. 2; McNeil, 1968: 54; Takeda & Miyake, 1969: 455; Heath, 1971; Stephenson, 1972 (record only).

Material examined. – Philippines: 1 male (20.8 × 11.0 mm) (ZRC), PANGLAO 2004, Panglao I., Biking – Catarman, stn. T28, 80 m, muddy sand, 1 Jul. 2004; 4 males (30.0 × 17.2 mm; 33.1 × 19.1 mm; 24 × 13.8 mm; 22.5 × 11.7 mm); 3 females (33.6 × 20.1 mm; 34.4 × 19.5 mm; 31.8 × 17.7 mm) (ZRC), PANGLAO 2004, between Panglao and Pamilacan I., stn. T27, 106-137 m, fine sand and mud with Echinoderms, 25 Jun. 2004.

Remarks. – Stephenson (1967) comments that there is distinct "male dimorphism", with a distinct gap between two forms of G1 he observed, but as there were no differences in other structures, he treated them merely as two forms of one species. I have observed those two forms in the Philippines and other material, but as the differences are not major, I agree with Stephenson (1967) to treat them as one species for the time being. Moosa (1981a) recorded *P. argentatus* in the Philippines: San Fernando, Port el Binanga; Panabutan in

Mindanao, the Pajumangan island of Tinakla, the island of Tawi-Tawi, group of the Sulu archipelago; and Tacbuc Point, Leyte.

***Portunus* (*Monomia*) *calla* sp. nov.**

(Figs. 12, 13)

Material examined. – Holotype (Here designated): 1 male (38.4 × 24.1 mm) (ZRC 2001.0633) Philippines: Bohol, Balicasag Island, 50-500m depth, coll. local fishermen with tangle nets, 28 Nov. 2001.

Diagnosis. – Frontal with 4 sharp, triangular teeth. Median pair slightly pointing anterolaterally. Anterolateral margin with 9 sharp teeth. Last tooth longest, points laterally. Carapace surface with conspicuously granulated areas, these separated by regions with dense pubecence (fig. 12A). Cheliped pubescent with squamiform granulation; merus with 3 spines on anterior border, 1 spine on posterior border; carpus with 2 usual spines; upper surface of hand with 2 spines, 1 at carpus articulation. Merus of third maxilliped slightly produced laterally (fig. 13F). Male abdomen with proximal end of telson much narrower than distal end of sixth somite, giving a step-like junction, lateral border concave (fig. 13G). G1 long, slightly twisted medially, tip is conical shape with flared tip (figs. 13A, B, C).

Remarks. – This species is close to *Portunus* (*Monomia*) *rubromarginatus* (Lanchester, 1900), with both species are sharing the following characteristics: a) four sharp frontal teeth; b) carapace dense pubecence with conspicuously granulated areas; and c) a step-like junction between sixth somite and telson. It differs, however, in that the a) frontal teeth are relatively sharper and more

protruding, with the median teeth directed more laterally (vs. less sharp and shorter); b) lateral border of the sixth male abdominal somite is concave (vs. straight); and c) G1 has a broad flared tip (vs. tapering G1 with a pointed tip).

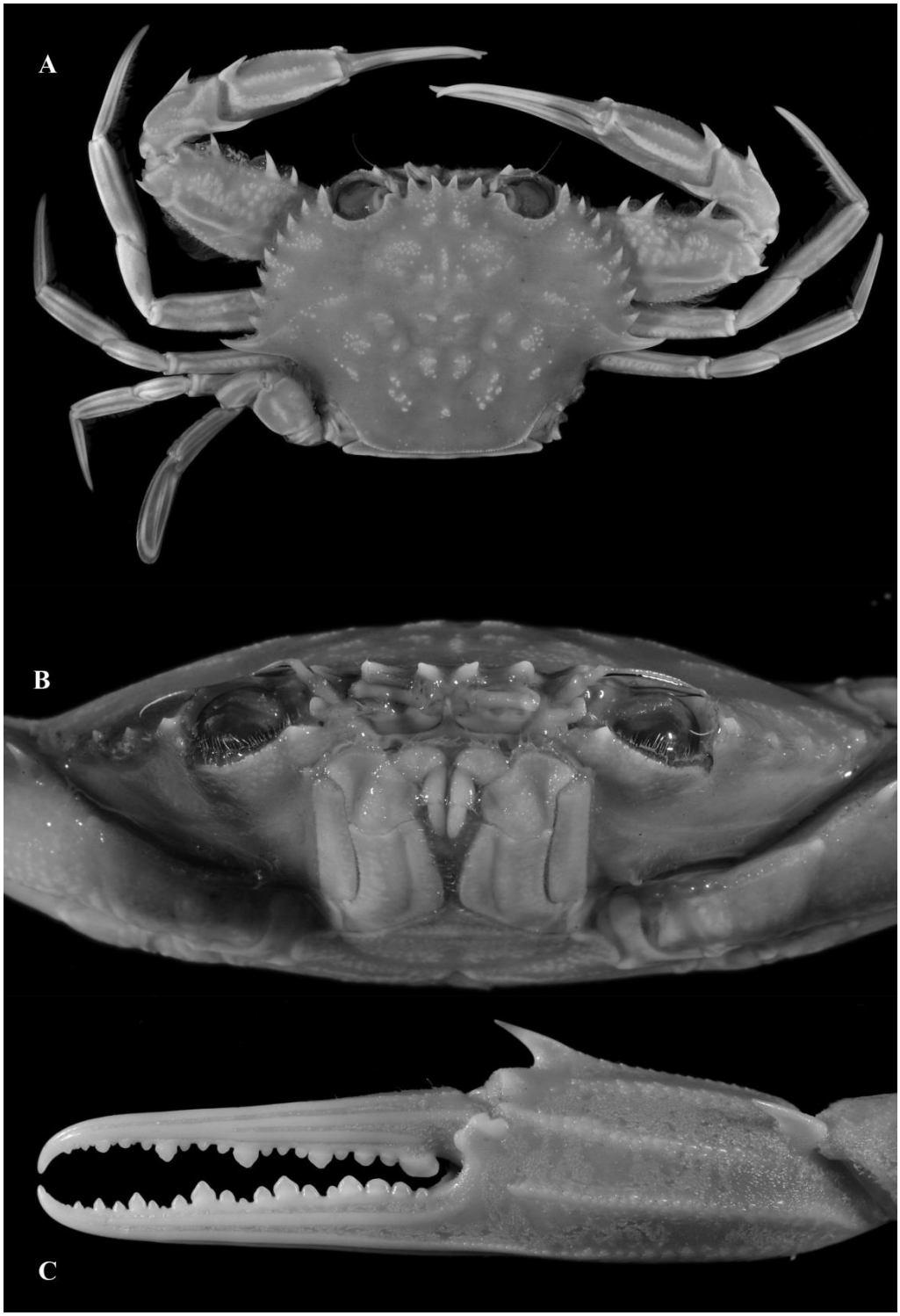


Fig. 12. *Portunus* (*Monomia*) *calla* sp. nov. Male. Holotype (38.4 × 24.1 mm) (ZRC 2001.0633). A. Dorsal view; B. Front view; C. Left chelae.

Etymology. – This species is named after the calla lily, a kind of flower which resembles the shape of the G1 of the new species. The name is used as a noun in apposition.

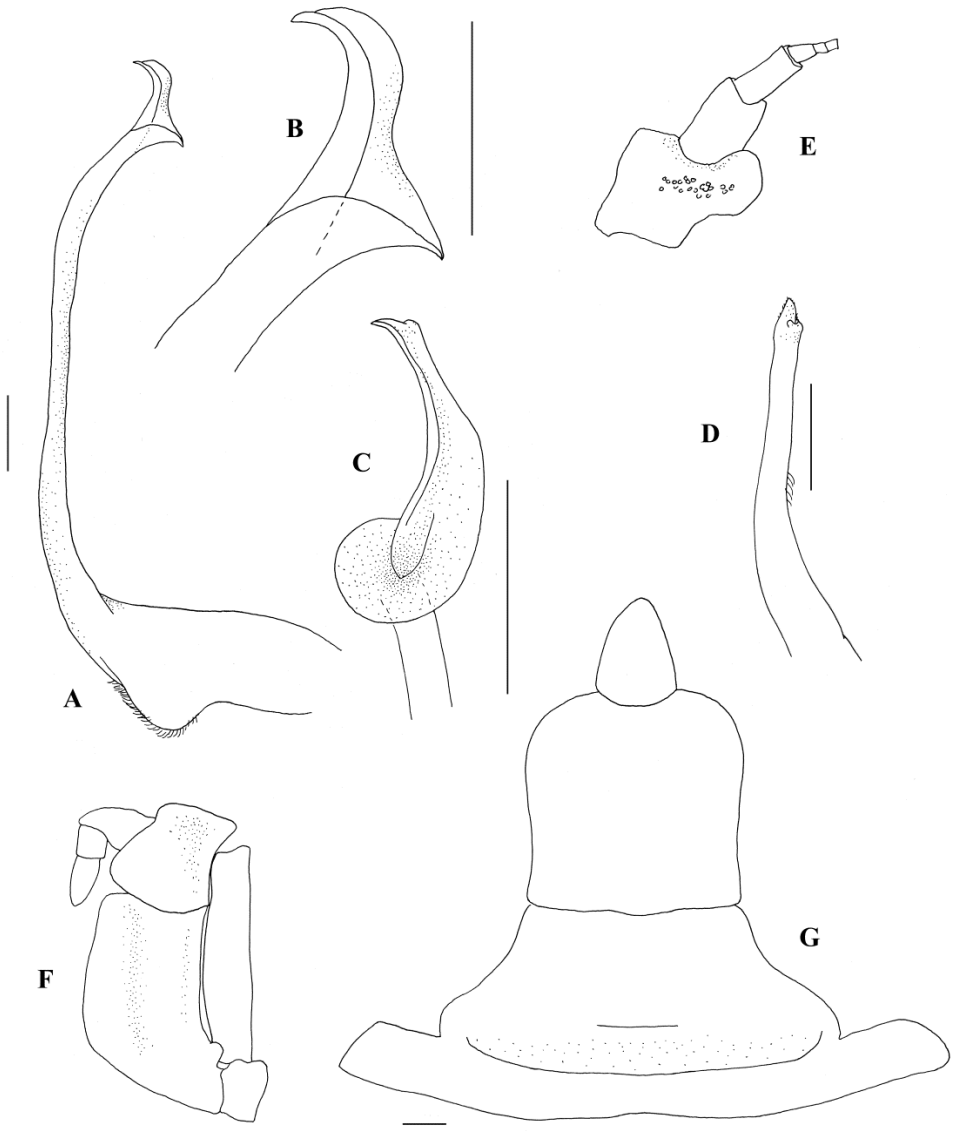


Fig. 13. *Portunus* (*Monomia*) *calla* sp. nov. Male. Holotype (38.4 × 24.1 mm) (ZRC 2001.0633). A. G1; B. Tip of G1 in ventral view; C. Lateral view of G1 tip; D. G2; E. Basal antenna segment; F. Third maxiliped; G. Male abdomen. Scale = 1.0 mm.

***Portunus* (*Monomia*) *euglyphus* (Laurie, 1906)**

Neptunus (*Amphitrite*) *euglyphus* Laurie, 1906: 413, figs. 6, 7.

Portunus (*Achelous*) *granulatus* – Edmondson, 1954: 239, figs. 16a, b (not fig. 17a). [not *Portunus* (*Achelous*) *granulatus granulatus* (H. Milne Edwards, 1834)

Portunus euglyphus – Stephenson & Rees, 1967a: 21, fig. 4, pl. 2B; Stephenson, 1972a: 135.

Material examined. – None.

Remarks. – Stephenson & Rees (1967a) have given a detail description and illutration of Philippines specimens of this species. The Philippine record was taken from that study.

***Portunus* (*Monomia*) *pseudoargentatus* Stephenson, 1961**

Portunus (*Amphitrite*) *gladiator* – De Haan, 1835: 39, pl. 1 fig. 5. [not *Portunus* (*Monomia*) *gladiator* Fabricius, 1798]

Neptunus (*Amphitrite*) *gladiator* – Sakai, 1939: 390, fig. 5a, pl. 47 fig. 3. [not *Portunus* (*Monomia*) *gladiator* Fabricius, 1798]

Portunus pseudoargentatus Stephenson, 1961a: 109, figs. 2A, 3F, pls. 2 fig. 4, 4F, 5D; Stephenson & Rees, 1967a: 25; Ng et al., 2008: 152.

Material examined. – None.

Remarks. – Stephenson (1972b) has recorded this species from Philippines.

***Portunus* (*Monomia*) *rubromarginatus* (Lanchester, 1900)**

Achelous rubrogarginatus Lanchester, 1900: 746, pl. 46 fig. 8.

Neptunus (Amphitrite) rubromarginatus – Shen, 1937: 104, fig. 3.

Portunus rubromarginatus – Stephenson & Campbell, 1959: 112, figs. 2K, 3K, pl. 3 fig.3, pls. 4K, 5K; Stephenson & Rees, 1968c: 295 (record only); Campbell & Stephenson, 1970: 272 (record only); Stephenson, 1972 (record only); Moosa, 1981a: 147; Yang et al., 2012: 157, fig. 58.

Material examined. – None.

Remarks. – One female specimen was reported from Jolo, Philippines (Moosa, 1981a)

Genus *Scylla* De Haan, 1833

Scylla De Haan, 1833: 11; Milne-Edwards, 1861: 347; Alcock, 1899: 27; Stephenson & Campbell, 1960: 111; Crosnier, 1962: 71; Keenan et al., 1998: 228.

Type species. – *Cancer serratus* Forskal, 1777, by subsequent designation.

Remarks. – The genus has been recently revised and fully treated by Keenan et al., (1998).

Scylla olivacea (Herbst, 1796)

Cancer olivaceous Herbst, 1796: 157, pl. 38 fig. 3; Keenan et al., 1998:233, figs. 7D, 8D, 9D, 14.

Scylla serrata – Estampador, 1949a: 99, pl. 1; Serène, 1952: 1, fig. 1C, pl. I(3), pl. II(3&C); Joel & Raj, 1980: 39, figs. 2, 4, 6, 8, 10a-b; Apel & Spiridonov, 1998: 314.

(?) *Scylla serrata* – Alcock, 1899: 27(part); Chopra & Das, 1938: 391 (part); Chhapgar, 1957: 416, pl. 5a-b (part); Sankarankutty, 1961: 102 (list), 104 (part); Tirmizi & Kazmi, 1983: 369 (part); Tirmizi et al., 1986: 3, figs. 1A-D (part); Devi, 1993: 535 (part); Tirmizi & Kazmi, 1996: 13, figs. 5A-E (part).

Material examined. – None.

Remarks. – Keenan et al. (1995) has recorded this species from the Philippines. Estampador (1949) had earlier misidentified this species as *S. serrata*.

Scylla paramamosain **Estampador, 1949**

Scylla serrata var. *paramamosain* Estampador, 1949a: 104, pl. 3, fig. 2.

Scylla oceanica – Serène, 1952: 1, fig. 1A, pl. I(1), II(1&A).

Scylla serrata – Holthuis, 1978: 15; Chen, 1989: 352, fig. 321.

Scylla paramamosain – Keenan et al., 1998: 232, figs. 7C, 8C, 9C, 13.

Material examined. – None.

Remarks. – Type locallity of *Scylla paramamosain* Esptampador, 1949, is the Indonesia. Estampador (1959) recorded this species for the Philippines but no detail location was provided.

Scylla serrata (Forskål, 1775)

Cancer serratus Forskal, 1775: 90.

Portunus serratus – Ruppel, 1830: 10, pl. 2.

Achelous crassimanus Macleay, 1838: 61; Stebbing, 1910: 308.

Portunus (*Scylla*) *serratus* – De Haan, 1833: 44.

Scylla tranquebariaca var. *occeanica* Dana, 1852: 270.

Scylla oceanica – Estampador, 1949a: 101, pl. 1 fig. 2.

Scylla serrata – Barnard, 1950: 160, figs. 31b,c; Crosnier, 1962: 72073, figs. 128, 129; Guinot, 1967: pl. 1 fig. 1; Melo, 1983: 159, figs. 1-3; Keenan et al., 1998: 228, figs. 7A, 8A, 9A, 10; Apel & Spiridonov, 1998: 312.

Scylla serrata var. *paramamosain* – Serène, 1952: 1, fig. 1D, pls. I(4), II(4&D).

Scylla tranquebarica – Joel & Raj, 1980: 39, 50, figs. 1, 3, 5, 7, 9a-b. [not *Scylla tranquebarica* (Fabricius, 1798)]

Material examined. – None.

Remarks. – *Achelous crassimanus* Macleay, 1838, has been formally synonymised with *Scylla serrata* by Keenan et al. (1998). As the type specimen of *A. crassimanus* was lost, Keenan et al. (1998) selected a neotype for this species to prevent any doubt about its identity.

Scylla tranquebariaca var. *occeanica* Dana, 1852, was elevated to full species rank by Estampador (1949). However, Keenan et al. (1998) treated it as junior synonym of *S. serrata* because its wide distribution is matched with *S. serrata* and there were not enough features to separate them. I agree with

the conclusion by Keenan et al. (1998) and treat those two species as synonyms of *S. serrata* in this thesis.

This species is very common and widely distributed in the Philippines: Mondoro, Palawan, Cagayan, Camarines (Estampador, 1959).

Scylla tranquebarica (Fabricius, 1798)

Portunus tranquebarica Fabricius, 1798: 366.

Lupa lobifrons H. Milne Edwards, 1834: 453.

Scylla tranquebarica – Estampador, 1949a: 103, pl. 3 fig. 1; Serène, 1952: 1, fig. 1B, pls. 1(2), 11 (2, B); Keenan et al., 1998: 230, figs. 7B, 8B, 9B, 11; Apel & Spiridonov, 1998: 313.

Material examined. – None.

Remarks. – *Lupa lobifrons* H. Milne Edwards, 1834 was described based on juvenile specimens. Keenan et al. (1998) has examined specimens and concluded this species as junior synonym of *S. tranquebarica*. This species is very widely distributed throught the Philippines (Estampador, 1959).

Genus *Thalamita* Latreille, 1829

Thalamita Latreille, 1829: 33.

Talamita [sic] – Rüppell, 1830: 4.

Thalamita – A. Milne-Edwards, 1860: 228; A. Milne-Edwards, 1861: 354; Alcock, 1899: 72-73; Stephenson & Hudson, 1957: 314, 316 (key); Crosnier, 1962: 93;

Stephenson, 1972b: 16 (key), 44; Wee & Ng, 1995: 58; Apel & Spiridonov, 1998: 226.

Type species. – *Cancer admete* Herbst, 1803, by monotypy.

Remarks. – *Thalamita* Latreille, 1829, is the largest genus in the Portunidae with 89 species (Ng et al., 2008). Stephenson & Hudson (1957) attempted to divide this genus into several groups but not completely. Currently, it is more appropiate to consider groups of species, instead of establishing numerous subgenera.

***Thalamita admete* (Herbst, 1803)**

Cancer admete Herbst, 1803: 40, pl. 57, fig. 1.

Thalamita admete – Calman, 1900: 23; Stimpson, 1907: 83; Sakai, 1939: 421, pl. 85 fig. 1; Sakai, 1976: 377, pl. 130 fig. 2; Barnard, 1950: 176, fig. 33c; Edmondson, 1954: 255, figs. 30a-b, 31a, 31e; Estampador, 1959: 70; Stephenson & Hudson, 1957: 320, figs. 21, 31, p1. 1 fig. 1, pl. 7A, 1OA; Stephenson, 1961: 117; Stephenson, 1972: 141; Stephenson, 1975: 188; Stephenson, 1976: 19; Forest & Guinot, 1961: 30, figs. 19a-b; Crosnier, 1962: 96, figs. 154, 157, 162-164, 168; Ow-Yang, 1963: 99, pl. 21 fig. A-F; Stephenson & Rees, 1967a: 18; Stephenson & Rees, 1967b: 56, fig. 20; McNeill, 1968: 51; Heath, 1973: 14, figs. 9a, 11b, 11d; Takeda & Nunomura, 1976: 68; Yang et al., 1979: 85, fig. 11; Lovett, 1981: 130, figs. 294a-d; Dai et al., 1986: 235, pl. 31(6), fig. 139(1); Dai & Yang, 1991: 256, pl. 31(6), fig. 139(1); Wee & Ng, 1995: 59, figs. 29A-F; Apel & Spiridonov, 1998: 228, figs. 42, 47.

Thalamita admeta – Alcock, 1899: 82; Tweedie, 1950: 84, fig. 2b.

Thalamita admeta var. *admete* – Borradaile, 1903: 202.

(?) *Thalamita admeta* var. *edwardsi* - Borradaile, 1900: 579.

Not *Thalamita Savignyi* A. Milne Edwards, 1861: 357; *Thalamita admeta* var. C *Savignyi* – Borradaile, 1903: 202; *Thalamita admeta* var. *Savigny* – Nobili, 1906:202; *Thalamita admete* var. *Savignyi* – Laurie, 1915: 440; *Thalamita admeta* var. D *granosimana* Borradaile, 1903: 202; *Thalamita admete* var. E *intermedia* Borradaile, 1903: 203; *Thalamita admeta* var. F *quadrilobata* – Borradaile, 1903: 203.

Material examined. – Philippines: 1 ovig. female (5.3 × 3.4 mm) (ZRC), PANGLAO 2004, Panglao I., Looc (lagoon inside), stn. S40, 0-3 m, fringe mangrove, subtidal, seagrass and hard bottom.

Remarks. – Estampador (1959) recorded this species from Palawan, Mindoro, Negros.

***Thalamita auauensis* Rathbun, 1906**

Thalamita auauensis Rathbun, 1906: 874, pl. 12 fig. 1; Edmondson, 1951: 222, fig. 24b; Edmondson,1954: 257, figs. 32a-d; Stephenson & Campbell, 1957: 319, 320; Stephenson & Rees, 1967a: 61, figs. 21, 22; Stephenson 1972: 144; Crosnier, 2002: 424, fig. 13; Pedro, 2011: 73; Komatsu, 2011: 257, figs. 21D, 22G–I.

Material examined. – Philippines: 1 male (10.9 × 6.6 mm), 1 female (14.8 × 9.1 mm) (ZRC), PANGLAO 2004, Pamilacan I. stn. B22, 15-20 m, rubble on mixed bottom, 24 Jun. 2004; 4 males (24.1 × 14.5 mm, 21.1 × 13 mm, 21.9 × 13.9 mm, 20.5 × 12.8 mm), 1 male (17.8 × 11.2 mm), 1 ovig. female (14.0 ×

9.0 mm) (ZRC), PANGLAO 2004, Pamilacan I., stn. S22, 15-20 m, hard ground covered with sand, 21 Jun. 2004; 14 males, 12 females (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, Dipolog Bay, stn. CA2366, 64-65 mm, 26 May 2005.

Remarks. – This species was found in East Africa, China, Philippines, Marianas, Samoa and Hawaii (fide Stephenson, 1972b).

Thalamita chaptalii (Audouin, 1826)

Portunus chaptali Audouin & Savigny, 1825: 83, pl. 4 fig. 1.

Thalamita chaptali – A. Milne-Edwards, 1861: 360; Alcock, 1899: 80; Rathbun, 1910: 365, fig. 44; Stephenson & Hudson, 1957: 327, figs. 2F, 3F, pl. 1 figs. 3, pl. 7C, 10B; Crosnier, 1962: 111, figs. 184, 189, 191; Stephenson & Rees, 1967a: 64; Stephenson, 1972: 45; Dai et al., 1986: 238, pl. 32(3), fig. 140(2); Dai & Yang, 1991: 258, pl. 32(3), fig. 104A(2).

Material examined. – Philippines: 1 male (10.2 × 7.2 mm) (ZRC), PANGLAO 2004, stn. M57, Panglao I., Sungcolan inlet, 0 m, fringe mangrove, 4 Jul. 2004.

Remarks. – This species is distributed in Bataan, Mindoro, Pangasinan, Silu of the Philippines (fide Cariaso & Garcia, 1986).

Thalamita crenata Rüppell, 1830

Portunus crenatus Latreille, 1829 (fide H. Milne Edwards, 1834: 463)

Thalamita crenata – Miers, 1884: 232; De Man, 1888: 79; De Man, 1895: 569; Alcock, 1899: 76; Lanchester, 1900: 748; Stimpson, 1907: 84, p1. 10, fig. 6a; Rathbun, 1910: 365; Balss, 1922: 111; Delsman & De Man, 1925: 313, pl. 14a; Sakai, 1939: 413, pl. 84, fig. 3; Sakai, 1976: 369, pl. 132 fig. 1; Shen, 1937: 129, figs. 16a-d; Barnard, 1950: 172, figs. 27a, 33a; Edmondson, 1954: 267, fig. 39b, 40a-f; Stephenson & Hudson, 1957: 332, figs. 2Q, 3Q, pl. 2 fig. 3, pls. 7F, 9C; Crosnier, 1962: 130, figs. 220, 226, 227, 232, 233; Ow-Yang, 1963: 105, pl. 22, figs. A-F, Bl; Stephenson & Rees, 1967a: 66, Stephenson & Rees , 1967b: 19; Stephenson, 1972: 145; Stephenson, 1975: 190; Takeda & Shimazaki, 1974: 53; Moosa, 1980: 72, fig. 6C; Lovett, 1981: 128, figs. 287a-d; Dai et al., 1986: 225, pl. 30(3), fig. 134(1); Dai & Yang, 1991: 246, pl. 30(3), fig. 134(1); Wee & Ng, 1995: 69, figs. 34A, B, 35 A, B, 36A-H; Apel & Spiridonov, 1998: 233, figs. 44, 49-50, pl. 8.

Thalamita prymna var. *crenata* - Laurie, 1906: 418; Montgomery, 1931: 430; Stephensen, 1946: 125.

Not *Thalamita crenata* – Dana, 1852: 282.

Material examined. – Philippines: 1 male (57.2 × 37.2 mm) (ZRC), PANGLA0 2004, stn. M7, Panglao I., Momo Beach, 0-3 m, reef platform with seagrass 1 Jun. 2004.

Remarks. – This species is distributed in: Jolo, Samar, Capiz Province, Ilo Ilo Province, Negros of the Philippines (fide Estampador, 1959).

Thalamita corrugata Stephenson & Rees, 1961

(Plate 3C)

Thalamita cooperi - Stephenson & Hudson, 1957: 331, pl. l fig. 4, pl. 10 fig. C (not *Thalamita cooperi* Borradaile, 1903).

Thalamita corrugata Stephenson & Rees, 1961: 421, figs. 1A, C, E, F; 2A-C; Guinot, 1962: 9; Stephenson, 1972b: 46.

Material examined. – Philippines:1 female, (8.2 × 5.5 mm) (ZRC), PANGLAO 2004, stn. B8, Panglao I., Napaling, 3 m, subtidal reef platform, 7 Jun. 2004.

Remarks. – This species is most closely allied to but different from *T. woodmasoni* Alcock, 1899, and *T. demani* Nobili, 1905, by having additional small transverse ridges or corrugations to the normal ridges on the carapace dorsal surface. This species is recorded from the Philippines by Stephenson (1972b).

Thalamita danae Stimpson, 1858

Thalamita danae Stimpson, 1858: 37; Stimpson, 1907: 85, pl. 11 figs. 1,1a; A. Milne-Edwards, 1861: 366, pl. 30 fig. 1; Lanchester, 1900: 749; Rathbun, 1911: 207; Shen, 1937: 129, figs. 16a-d; Sakai, 1939: 415, pl. 85 fig. 3; Sakai, 1976: 369, p1.132 fig. 3; Tweedie, 1950: 84; Stephenson & Hudson, 1957: 335, figs. 2N, 3N, pl. 3, fig. 1, pls. 7G, 1OD; Ow-Yang, 1963: 109, pl. 23, figs. A-F, Bl, B2; Stephenson & Rees, 1967a: 70, figs. 25a-e, 26a-c; Stephenson, 1972: 145, figs. 6, 7; Stephenson, 1975: 191; Moosa, 1980: 73, fig. 6D; Lovett, 1981: 130, figs.

288a-c; Dai et al., 1986: 226, pl. 30(4), fig. 134(2); Yang & Dai, 1991: 247, pl. 30(4), fig. 134(2); Wee & Ng, 1995: 73, figs. 37A-C, 38A-C, 39A-C, 40A-B, 41A-D, 42A-I; Apel & Spiridonov, 1998: 239, fig. 54.

Thalamita stimpsoni A. Milne Edwards, 1861: 362, pl. 30 fig. 1; Alcock, 1899: 79; Estampador, 1959: 69; Nobili, 1906: 205; Sakai, 1939: 413; Sakai, 1976: 372, pl. 131 fig. 3; Stephenson & Hudson, 1957: 356, figs. 2M, 3M, pl. 6, figs. 1-3, pl. 8R, 91; McNeill,1968: 51; Takeda, 1989: 156.

(?)*Thalamita stimpsoni* Stephenson & Rees, 1967a: 98, fig. 36.

Thalamita prymna var. *stimpsoni* – Borradaile, 1900: 579.

(?) *Thalamita prymna b* – Calman, 1900: 22.

Thalamita prymna var. *proxima* Montgomery, 1931: 429, pl. 24 fig. 1, pl. 29 fig. 1, la.

Thalamita crenata – Dana, 1852: 282, pl. 17 figs. 7a-b. [not *Thalamita crenata* Rüppell, 1830]

Not *Thalamita danae* – De Man, 1887: 78, pl. 4, figs. 8, 9; Alcock, 1899: 77; Barnard, 1950: 174.

Material examined. – Philippines: 1 female (45.5 × 28.6 mm) (ZRC), PANGLAO 2004, Panglao I., Danao, stn. M3, 0-2.5 m, intertidal to shallow subtidal reef, 31 May 2004.

Remarks. – Wee & Ng (1995) have given a very detail description and remarks on this species.

Thalamita coeruleipes Hombron & Jacquinot, 1846

Thalamita coeruleipes Jacquinot, 1852: pl. 5 figs. 6-10; Jacquinot & Lucas, 1853: 53; Edmondson, 1954: 265, figs. 38a-f, 39a; Stephenson & Hudson, 1957: 329, figs.

2P, 3P, pls. 2 fig. 1, 7D, 9B; Forest & Guinot, 1961: 32; Crosnier, 1962: 128, figs. 219 bis a-b, pl. 11 fig. 2.

Material examined. – None.

Remarks. – Cariaso & Garcia (1986) has recorded this species from the Philippines.

Thalamita demani Nobili, 1905

(Fig. 14)

Thalamita demani Nobili, 1905: 402, figs. 2D; 3C; 4D; 7C; 8B, E; 9C, F; 10C; Nobili, 1906a: 209; Crosnier, 1962: 123, figs. 200, 208, 209; Heath, 1973: 15, fig. 13b; Stephenson & Rees, 1967a: 74; Stephenson, 1972a: 47; Stephenson, 1976: 20; Vannini, 1983: 811,figs. 2D; 3C; 4D; 7C; 8B, E; 9C, F; 10C.

(?) *T. trilineata* Stephenson & Hudson, 1957: 359, figs. 2 E, 3 E, pl. 6 fig. 4, pl. 8 fig. S, pl. 10 fig. L.

Material examined. – Philippines: 1 male (5.4 × 3.7 mm) (ZRC), PANGLAO 2004, Panglao I. Gak-Ang Islet, stn. M18, 0-1 m, sandy bottom and seagrass, 10 Jun. 2004; 1 male (10.8 × 7.5 mm) (ZRC), PANGLAO 2004, Napaling, stn. B8, 3 m, subtidal reef platform, 1 female (10.1 × 7.4 mm) (ZRC), PANGLAO 2004, Panglao I. Momo Beach, stn. M7, 0-3 m, reef platform with seagrass, 1 Jun. 2004; 1 ovig. female (9.8 × 6.7 mm) (ZRC), PANGLAO 2004, Panglao I., Sungcolan Bay, stn. M11, 0-3 m, rocky intertidal, fringe mangrove and seagrass, 6 Jun. 2004.

Remarks. – This species is distributed in Red Sea, Madagascar, Philippines, Australia, Mauritius.

Fig. 14. *Thalamita demani* Nobili, 1905. Male (5.4 × 3.7 mm) (ZRC PANGLAO 2004, stn. M18. A. Dosal view of carapace; B. G1. Scale: A. = 1.0 mm, B. = 0.5 mm.

Thalamita foresti Crosnier, 1962

Thalamita foresti Crosnier, 1962: 132, figs 221-223, 229-231, pl. 12 fig. 1, Stephenson & Rees, 1967a: 74-75, figs 25 f, 26 d; Stephenson, 1972a: 149; Stephenson, 1972b: 16, 46; Stephenson, 1975: 102, fig. 5B; Heath, 1973: 2, 15, figs 6b, 8b, 12b; Vannini, 1976: 123.

Thalamita danae – De Man, 1888: 78, pl. 4 figs. 8, 9; Nobili, 1906b: 203 (part);

(?) *Thalamita helleri* Hoffmann, 1874: 10, pl. 1 fig. 5.

(?) *Thalamita danae* – Barnard, 1950: 174. [not *Thalamita danae* Stimpson, 1858]

Material examined. - None

Remarks. – This species can be found in Madagascar, Thailand, Hong Kong, Philippines (fide Stephenson, 1972a).

Thalamita gatavakensis Nobili, 1906

Thalamita pilumnoides var. *gatavakensis* Nobili, 1906: 262.

Thalamita pilumnoides gatavakensis – Forest & Guinot, 1961: 34, figs. 22-25.

Thalamita gatavakensis – Crosnier, 1962: 106, figs. 156a-c, 156e, 177a-d; Stephenson & Rees, 1967a: 75; Stephenson, 1972a: 149; Stephenson, 1976: 21.

Thalamita granosimana – Stephenson, 1961: 119, figs. 2E, 4A, pls. 4J, 5G. [not *Thalamita granosimana* Borradaile, 1903]

Material examimed. – None.

Remarks. – This species has a wide distribution ranging from Madagascar to Philippines, Indonesia, and to French Polynesia (fide Stephenson, 1972, 1976; Wee & Ng, 1995).

Thalamita gracilipes (A. Milne Edwards, 1873)

(Fig. 15)

Thalamonyx gracilipes A. Milne Edwards, 1873: 169, figs. 3a-d, pl. 4 fig. 3; Crosnier, 1962: 91, fig. 153 bis a-d.

Thalamonux danae var. *gracilipes* – Miers, 1886: 192.

Thalamita gracilipes – Stephenson & Hudson, 1957: 361; Stephenson & Rees, 1967b: 20, fig. 2d, 2h; Stephenson, 1972a: 149; Stephenson, 1972b: 48.

Material examined. – Philippines: 2 males (10.2 × 7.1 mm; 6.7 × 4.7 mm), 1 female (11.0 × 7.8 mm) (ZRC), PANGLAO 2004, Balicasag I., Black forest, stn. S3, 6m, edge of reef flatform, 4 Jun. 2004.

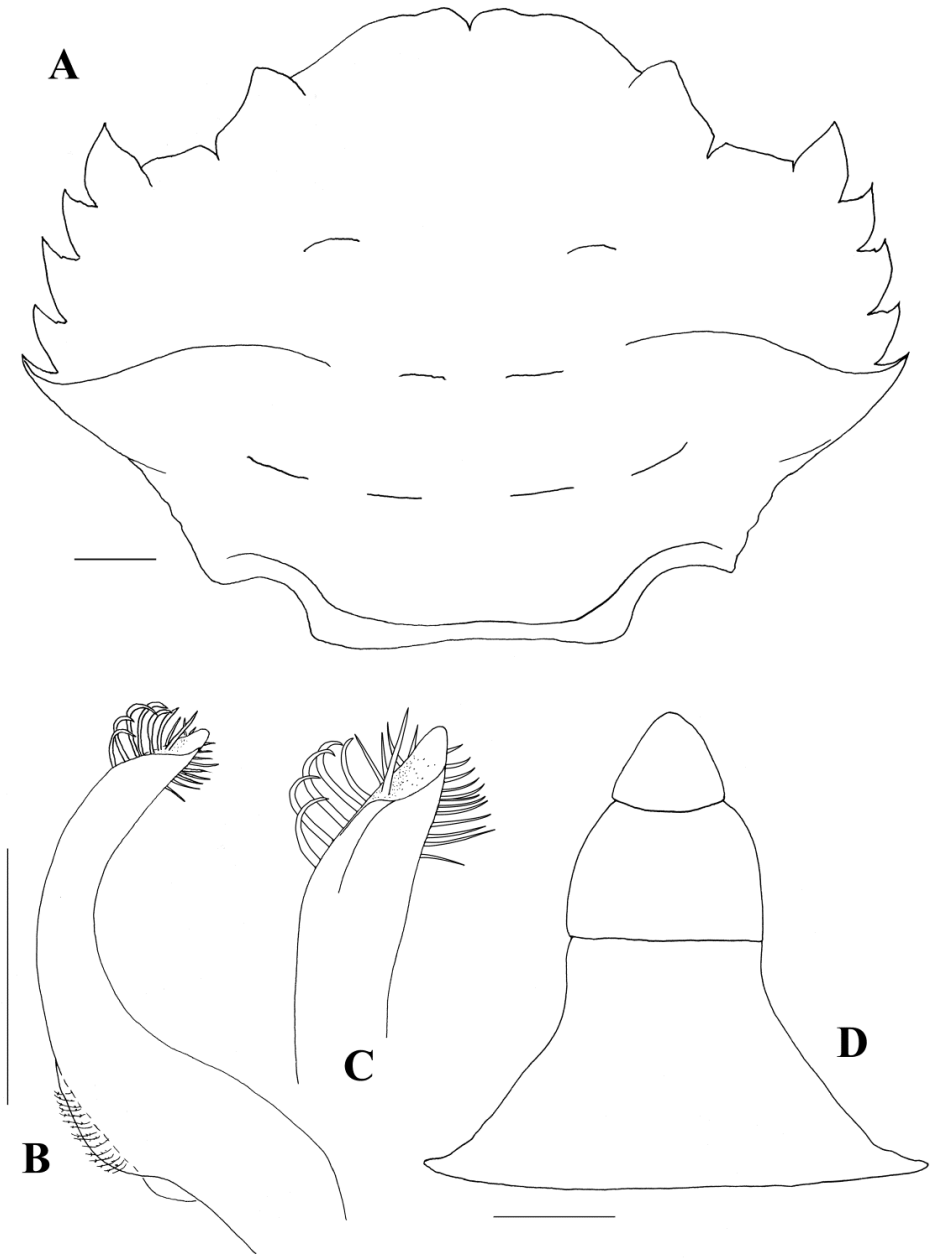


Fig. 15. *Thalamita gracilipes* (A. Milne Edwards, 1873). Male (10.2 × 7.1 mm) PANGLAO 2004 stn. S3. A. Carapace; B. G1; C. Tip of same G1; D. Abdomen. Scale = 1.0 mm.

Remarks. – The G1 of our specimen fits well with figure provided by Stephenson & Rees (1967b: fig. 2d, h). Stephenson & Rees (1967b) have reviewed this species and commented that the figure of carapace provided in Edmondson (1954: fig 26a) showing a continous ridge in posterior half of

carapace should be an inacuracy of craftsmanship, and figure of G1 provided by Crosnier (1962: fig. 153 bis d) is from an immature specimen. Stephenson (1972a) first recorded this species from the Philippines.

Thalamita granosimana Borradaile, 1902

Thalamita granosimana Borradaile, 1902: 202; Crosnier, 1962: 103, figs. 171, 172, 175-177, pl. 8 fig. 2, pl. 13 fig. 3; Guinot, 1962: 16, figs. 2a-b; Stephenson & Rees, 1967a: 77, fig. 27; Stephenson, 1972a: 149 (record only); Stephenson, 1972b: 19, 48.

Not *Thalamita granosimana* – Stephenson, 1961 (= *T. gatawakensis* Nobili, 1906).

Material examined. – None.

Remarks. – Stephenson (1972a) recorded this species for Philippines.

Thalamita imparimana Alcock, 1899

Thalamita imparimanus Alcock, 1899b: 87; Alcock & Anderson, 1900: pl. 47, figs. 3, 3A.

Thalamita imparimana – Stephenson & Rees, 1967: 78, fig. 28, pl. 7A; Zarenkov, 1969: 35, fig. 2; Ng et al., 2008: 154; Yang et al., 2012: 287, fig. 109, pl. 12(5).

Thalamita muusi Serène & Soh, 1976: 15, fig. 10, pl. 4 fig. D; Ng et al., 2008: 154.

Material examined. – Philippines: 1 male, 2 females (ZRC), PANGLAO 2004, Bohol I., W of Baclayo, stn. T6, 34-82m, coarse muddy sand with large sponges, 2 Jun. 2004; 1 male (10.9 × 7.1 mm) PANGLAO 2004, label

missing; 7 males (13.5 × 8.5 mm; 14.2 × 9.4 mm; 15.2 × 9.9 mm; 15.1 × 9.6 mm; 14.2 × 9.2 mm; 13.3 × 8.7 mm; 13.4 × 8.6 mm), 4 females (12.4 × 7.8 mm; 11.5 × 7.2 mm; 11.0 × 7 mm; 11.1 × 7.2 mm), 8 ovig. females (10.5 × 6.5 mm; 12.2 × 7.6 mm; 11.3 × 7.2 mm; 11.1 × 6.9 mm; 12.3 × 7.6 mm; 12.2 × 7.5 mm; 8.9 × 6.0 mm; 9.5 × 6.1 mm) (ZRC), PANGLAO 2005, stn. CP2378, Dipolog Bay, 65 m, 28 May 2005.

Remarks. – Stephenson & Rees (1967) recorded this species for the Philippines from Albatross expedition material. This species has a distinct double curved G1, flared and swollen tip, bearing a crest of long bristles; overall resembling a crested crane (Stephenson & Rees, 1967a). Serène & Soh (1976) described a new species, *Thalamita muusi* from Phuket. They compared this species to *T. intermedia* Miers, 1886, *T. annulipes* Stephenson & Hudson, 1957, *T. hanseni* Alcock, 1899, *T. kagosimensis* Sakai, 1939, and *T. sexlobata* Miers, 1886, but not to *T. imparimanus* Alcock, 1899. Ng et al. (2008) recognised that they are two different species. However, in a recent study, Yang et al. (2012) synonymised *T. muusi* under *T. imparimana*. We agree with Yang et al. (2012) as the description, drawing and photo of *T. muusi* by Serène & Soh (1976) fit well with *T. imparimana*, including the signature G1 and male abdomen shapes.

Thalamita integra Dana, 1852

Thalamita integra Dana, 1852: 85; Stimpson, 1858: 39; Miers, 1884: 540; De Man, 1888: 74; Henderson, 1893: 373; Alcock, 1899: 85; Rathbun, 1906: 873; Sakai, 1939: 420, fig. 15, pl. 84, fig. 2; Sakai, 1976: 377, fig. 201; Barnard, 1950: 177; Edmondson, 1954: 252, figs. 27a-c, 28a; Stephenson & Hudson, 1957: 339, figs.

2H, 3H, pl. 3, fig. 3, pl. 71, 10F; Crosnier, 1962: 103, fig. 156, 161, 170; Stephenson & Rees, 1967a: 79; Stephenson, 1972: 149; Stephenson, 1975: 197; Stephenson, 1976: 22; Takeda & Shimazaki, 1974: 54; Dai et al., 1986: 235, pl. 31(5), fig. 138(2); Dai & Yang, 1991: 255, pl. 31(5), fig. 138(2).

Material examined. – None.

Remarks. – Estampardor (1959) recorded *Thalamita integra* Dana, 1852 from Negros, Sicaba of the Philippines.

***Thalamita kagosimensis* Sakai, 1939**

Charybdis sp. Urita, 1926: 7.

Thalamita kagosimensis Sakai, 1939: 419, fig. 14; Sakai, 1965: 124, pl. 63 fig. 4; Cariaso & Garcia, 1986: 228, fig. 36.

Material examined. – Philippines: 1 male (33.8 × 24.0 mm) (ZRC), PANGLAO 2004, Panglao I, off San Isidro, stn. T10, 117-124 m, mud and fine sand, 15 Jun. 2004; 2 males, (26.2 × 19.1 mm, 20.2 × 14.3 mm), 1 female (23.1 × 16.6 mm) (ZRC), PANGLAO 2004, Panglao I., off San Isidro, stn. T10, 117-124 m, mud and fine sand, 15 Jun. 2004.

Remarks. – This species was recorded for the Philippines by Cariaso & Garcia (1986) and by the present study.

Thalamita malaccensis Gordon, 1938*

(Fig. 16, plate 3D)

Thalamita malaccensis Gordon, 1938: 176, figs. 2c, d, 3a, b; Stephenson, 1972: 149; Wee & Ng, 1995: 85, figs. 45a-c.

Material examined. – Philippines: 1 male (36.0 × 23.3 mm) (ZRC), AURORA 2007, stn. CP2653, trawl, 83 m, 16°06.500 N, 121°59.747 E, 20 May 2007.

Diagnosis. – Frontal with 6 lobes, the separation between submedians, laterals slight, medians more protruding, rounded. All frontal carapace ridges present; 1 pair of mesobranchial and cardiac ridges. Basal antennal segment bears a cresentric granular ridge. 5 anterolateral teeth, fourth slightly smaller than others. Cheliped with squamiform marking, merus with 3 spines on anterior border of merus, 1 nearest to basal is minute; carpus with thin, long spine on inner angle, 3 spinules at outer angle; palm with 5 teeth. Natatory leg with series of minute denticles on posterior border of propodus. Male abdomen with lateral margin of sixth somite slightly convex; a transverse keel presented on somites 3-5. G1 stout with flare tip, outer border with row of bristles on tip, bristles on inner border minute.

Remarks. – *Thalamita malaccensis* Gordon, 1938, is only known from female type specimens collected from Malaysia and another female from Java Sea (Stephenson, 1972a). The present specimen agrees well with description given by Gordon (1938) and the photo provided by Stephenson (1972a: fig. 4). This

is the first male specimen of *T. malaccensis* to be recorded and illustrated. The live specimen shows two dark coloured areas on the mesobranchial regions.

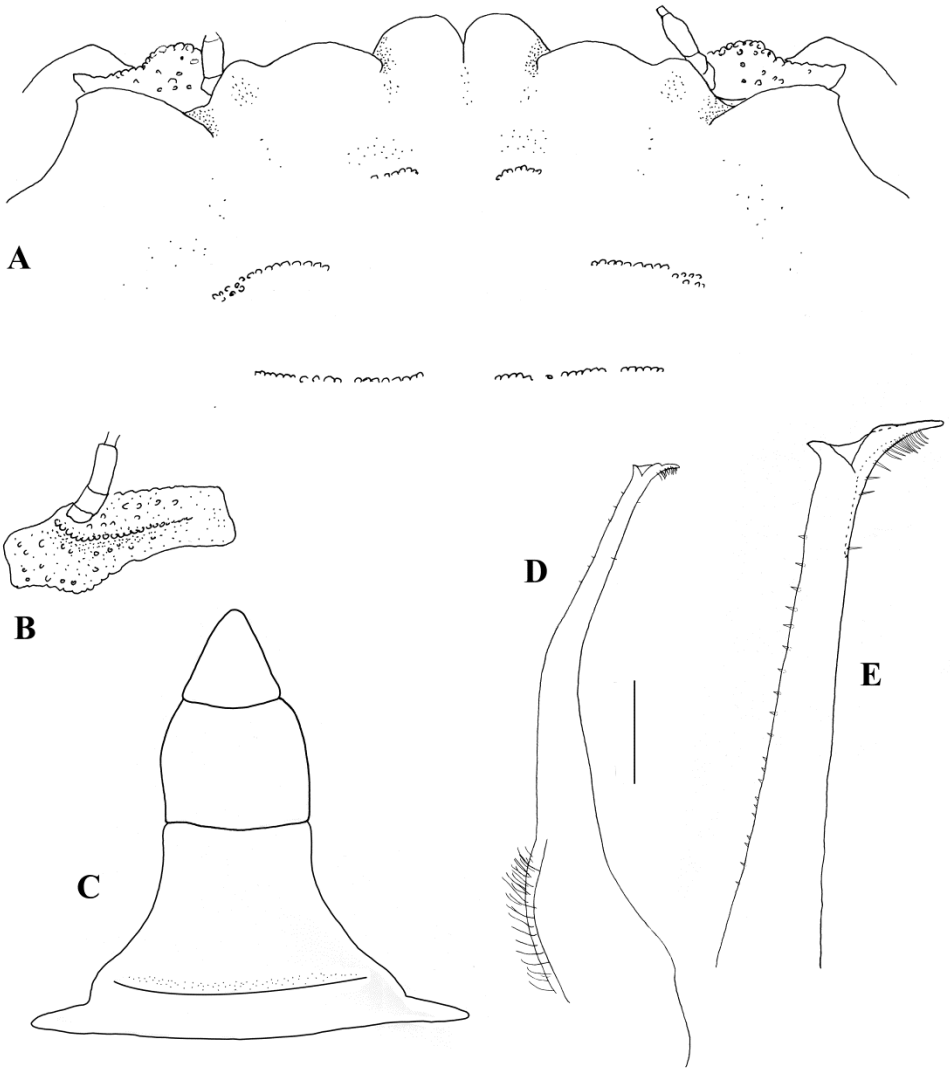


Fig. 16. *Thalamita malaccensis* Gordon, 1938. Male (36.0 × 23.3 mm) (AURORA 2007, stn. CP2653). A. Frontal teeth; B. Basal antenna segment; C. Male abdomen; D. G1; D. Tip of the same G1. Scale = 1.0 mm.

***Thalamita mitsiensis* Crosnier, 1962**

(Plate 3E)

Thalamita mitsiensis Crosnier, 1962: 127, fig. 212, 213, 216-218; Stephenson & Rees, 1967a: 80, fig. 29; Stephenson, 1972: 150; Stephenson, 1975: 199; Sakai , 1976: 372, pl. 133, fig. 3; Wee & Ng, 1995: 86, figs. 45D-G.

Material examined. – Philippines: 1 male (19.8 × 13.9 mm)(ZRC), PANGLAO 2004, Panglao I., Alona reef, stn. B2, 5 m, reef slope, 31 May 2004; 1 female (7.5 × 5.9 mm) (ZRC), PANGLAO 2004, Panglao I., Napaling, stn. B9, 8-10 m, caves in the reef wall, 8 Jun. 2004; 1 male (13.8 × 9.4 mm), PANGLAO 2004, Panglao I., Sungcolan, stn. B15, 2-4 m, reef wall with dead coral, 14 Jun. 2004; 2 males (18.4 × 13.7 mm, 19.2 × 14.3 mm) (ZRC), PANGLAO 2004, Pamilacan I., stn. B19, 17 m, reef slope with cave, 21 Jun. 2004.

Remarks. – This species was reported from Sulu Archipelago of the Philippines by Stephenson and Rees (1967a). For the colour of a live specimen, refer to Plate 3E.

Thalamita multispinosa Stephenson & Rees, 1967*

Thalamita multispinosa Stephenson & Rees, 1967a: 80, pl. 7B; Crosnier, 2002a: 430, fig. 18.

Thalamita picta – Poupin, 1996a: 35 (part.) [not *Thalamita picta* Stimpson, 1858].

Material examined. – Phillipines:1 female (17.6 × 12.4 mm) (ZRC), PANGLAO 2005, Dipolog Bay, stn. CP2380, 150-163 m, 28 May 2005 ; 1 male with sacculina (18.2 × 12.8 mm), 1 female (14.5 × 10.5 mm) (ZRC), PANGLAO 2004, Panglao I. Bolod, stn. T1, 83-102 m, mud and many sponges, 30 May 2004.

Remarks. – This is the first record of this species in the Phillipines.

Thalamita oculea Alcock, 1899

(Fig. 17, plate 3F)

Thalamita oculea Alcock, 1899b: 91; Alcock & Anderson, 1900: pl. 48, figs. 3, 3a; Rathbun, 1911: 210; Sakai, 1935a: 76; Sakai, 1935: 133, fig. 62; Sakai, 1939: 424, fig. 18; Crosnier, 1962: 109, figs. 173, 174, 178-180, 193, 194, pl. 9 fig. 1; Stephenson, 1972b: 19, 49.

Material examined. – 1 male (27.0 × 18.1 mm) (ZRC), PANGLAO 2005, Bohol/Sulu seas sill, Dipolog Bay, stn. CA2366, 64-65 mm, 26 May 2005.

Remarks. – This species is characterised by having many "wrinkles" on the thoracic sternum (fig. 17).

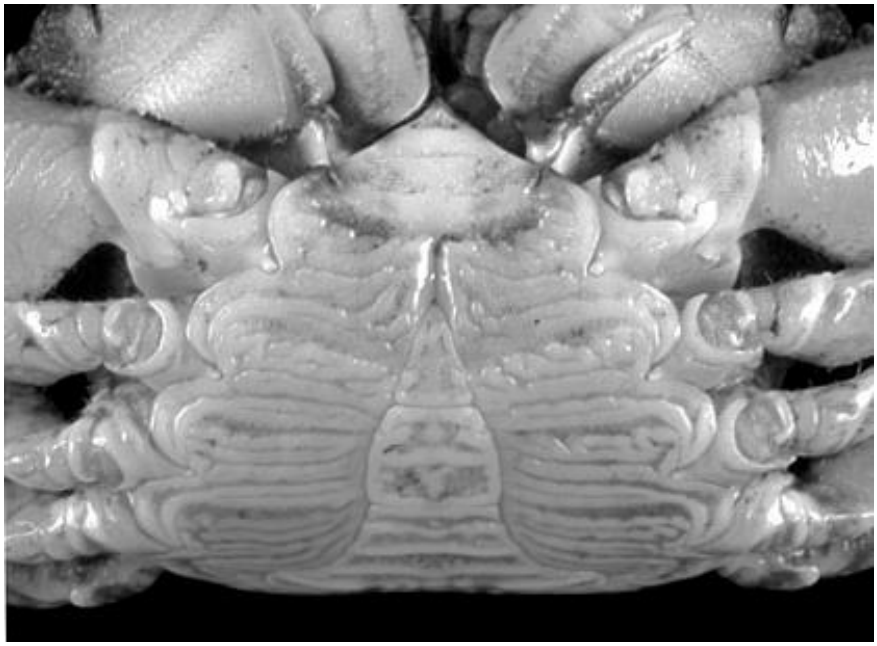


Fig. 17. *Thalamita oculea* Alcock, 1899. Thoracic sternum. Male (27.0 × 18.1 mm).

Thalamita parvidens (Rathbun, 1907)

Thalamonyx parvidens Rathbun, 1907: 62, pl. 5 fig. 9.

Thalamita parvidens – Sakai, 1939: 425, fig. 19; Stephenson, 1961: 122, figs. 2F, 4B, pl. 4 fig. 1, pls. 4K, 5H; Crosnier, 1962: 113, figs. 182, 185-187, 190, pl. 9 fig. 2; Sankarankutty, 1966: 355, figs. 5, 18, 19, 30; Stephenson & Rees, 1967a: 82, fig. 30; Stephenson & Rees, 1968c: 296.

Material examined. – None.

Remarks. – This species is distributed in Madagascar, India, Malaysian area, Philippines, Carolines, Japan, Australia (fide Stephenson, 1972b).

Thalamita picta Stimpson, 1858

Thalamita picta Stimpson, 1858: 39; Stimpson, 1907: 85, pl. 10, fig. 5; A. Milne-Edwards, 1873: 164, pl. 4, fig. 4; Miers, 1884: 540; Alcock, 1899: 79; Rathbun, 1906: 873; Balss, 1922: 111; Sakai, 1976: 373, pl. 131, fig. 2; Shen, 1937: 135; Ward, 1942: 81; Barnard, 1950: 175; Tweedie, 1950: 84; Edmondson, 1954: 263, figs. 35b, 36e-h; Stephenson & Hudson, 1957: 344, figs. 2A, 3A, pl. 4, figs. 2, pls. 8K, 10I; Forest & Guinot,1961: 33; Crosnier, 1962: 138, figs. 237-240, pl. 12, fig. 2; Ow-Yang, 1963: 116, pl. 24 figs. A-F, Al; Garth, 1965: 12, figs. 7, 11, 12; Stephenson & Rees, 1967a: 56; Stephenson, 1972: 150; Heath, 1973: 16, figs. 6e, 9d, 12d; Takeda & Shimazaki, 1974: 55; Yang et al., 1979: 83, fig. 8; Lovett, 1981: 130, figs. 290a-c; Dai et al., 1986: 229, pl. 30(8), fig. 136(1); Cariaso & Garcia, 1986: 231; Dai & Yang, 1991: 250, pl. 30(8), fig. 136(1).

Thalamita prymna var. *picta* – Borradaile, 1903: 201; Montgomery, 1931: 430.

Thalamita gardineri Borradaile, 1903: 205; Rathbun, 1911: 209.

Thalamita alcocki – Edmondson, 1954: 264, figs. 37a, b; Rathbun, 1906: 875 (not *Thalamita alcocki* De Man, 1902).

Charybdis picta – Ward, 1934: 9.

(?) *Thalamita investigatoris* Alcock, 1899: 85.

Material examined. – None.

Remark. – This species is reported from Batangas, Sulu, in the Philippines (Cariaso & Garcia, 1986).

Thalamita philippinensis Stephenson & Rees, 1967

Thalamita philippinensis Stephenson & Rees, 1967a: 84, fig. 31, pl. 8a; Stephenson, 1972 (record only); Poupin, 1996a: 35.

Material examined. – Philippines: 1 ovig. female (9.4 × 6.0 mm) (ZRC 2001.0632), Bohol, Balicasag I., 50-500m depth, coll. local fishermen with tangle nets, 28 Nov 2001; 2 males (19.2 × 12.6 mm, 13.5 × 8.7 mm), 1 female (15.5 × 10.1 mm) (ZRC), PANGLAO 2004, Maribohoc Bay, Bohol I., stn. P2, 400 m, tangle nets from local fishermen, 30 May 2004.

Remarks. – Stephenson & Rees (1967) described this species from specimens collected from Sulu and Davao Bay of the Philippines.

Thalamita prymna (Herbst, 1803)

Cancer prymna Herbst, 1803: 41, pl. 57, fig. 2.

Portunus (*Thalamita*) *prymna* – De Haan, 1835: 43, pl. 12, fig. 2, pl. A.

Thalamita prymna – De Man, 1888: 75, pl. 4, figs. 5, 6; Henderson, 1893: 372; Alcock, 1899: 78; Rathbun, 1910: 365; Shen, 1937: 133, fig. 18; Barnard,1950: 174; Chhapgar, 1957: 26, p1.7, figs. o-q; Crosnier, 1962: 136, figs. 234-236; Ow-Yang, 1963: 120 (part), pl. 25, figs. Al, B3; Stephenson & Rees, 1967a: 89 (part); Stephenson, 1972: 150(part); Heath, 1973: 16, fig. 6d, 9e, 12e; Lovett, 1981: 130 (part), fig. 292a; Dai et al., 1986: 228 (part), pl. 30(7), fig. 135(3); Dai & Yang, 1991: 249 (part), pl. 30(7), fig. 135(3).

Thalamita prymna form b – Tweedie, 1950: 84, fig. 1b.

Thalamita crassimana Dana, 1852: 284, pl. 17, figs. 9a-d; Stimpson, 1858: 39; Stimpson, 1907: 86.

(?)*Thalamita prymna* form C – Calman, 1900: 22.

(?)*Thalamita prymna* var. *annectans* – Laurie, 1906: 418.

(?)*Thalamita tenuipes* Borradaile, 1903: 204, fig. 35a-b.

Not *Portunus* (*Thalamita*) *prymna* – De Haan, 1835: 43 (part). [= *T. crenata* Rüppell, 1830 (part); = *T. danae* Stimpson, 1858 (part)] (fide Fransen et al., 1997).

Not *Thalamita prymna* form A – Calman, 1900: 22. [= *T. pelsarti* Montgomery, 1931) (fide Wee & Ng 1995).

(?) Not *Thalamita prymna* form B – Calman, 1900: 22. [= *T. danae* Stimpson, 1858 ?) (fide Wee & Ng, 1995).

Not *Thalamita prymna* – Sakai 1939: 416, pl. 51; Stephenson & Hudson 1957: 346, figs. 2R, 3R, pl. 4 fig. 3, pls. 8L, 9E; Stephenson & Rees, 1967a: 89 (part); Sakai 1976: 372, pl. 131 fig. 1; Stephenson 1972b: 17 (key), 50 (part); Dai & Yang, 1991: 249 (part), fig. 135(3), pl. 30(7). [= *T. pelsarti* Montgomery, 1931] (fide We & Ng, 1995).

Not *Thalamita prymna* (Herbst) var. *picta* Stimpson – Stephensen, 1946: 125-126. [= *Thalamita loppenthini* Apel & Spiridonov, 1998 (part); = *Thalamita indistincta* Apel & Spiridonov, 1998 (part)].

Not *Thalamita prymna* form a – Tweedie, 1950: 84, fig. 1a. [= *T. pelsarti* Montgomery, 1931] (fide Wee & Ng, 1995).

Not *Thalamita prymna*. – Titgen, 1982: 124. [= *Thalamita rubridens* Apel & Spiridonov, 1998]

Not *Thalamita prymna* – Yamaguchi & Baba, 1993: 422 (part), figs. 148b, d. [= *T. crenata* Rüppell, 1830 (part); = *T. danae* Stimpson, 1858 (part)]

Not *Thalamita prymna*. – Poupin, 1996a: 36 (specimen from Tahiti) [= *Thalamita pseudopelsarti* Crosnier, 2002].

Material examined. – None.

Remarks. – This species is distributed in between Panay and Negros, Luzon, Mindanao, Batan, Pilas (Stephenson & Rees, 1967a).

Thalamita pseudopelsarti* Crosnier, 2002

Thalamita prymna – Poupin 1996a: 36.

Thalamita pseudopelsarti Crosnier, 2002a: 432, figs. 19-22.

Material examined. – Philippines: 1 male (55.2 × 36.5 mm) (ZRC), Visayas, Bohol, Balicasag I., coll. local fishermen, purchased 2 Mar 2004.

Remarks. – This is a new record for the Philippines. According to Crosnier (2002a), there are no ridges behind epibranchial ridges of *T. pseudopelsarti*, there is a very faint and short pair of metagastric ridges on current specimen that visible under microscopic examinations. All the other characters agree and the present male specimen is best referred to this species.

***Thalamita pseudopoissoni* Stephenson & Rees, 1967**

Thalamita poissonii – Sakai, 1939: 423, fig. 17, pl. 85 fig. 2. [not *Thalamita poissonii* (Audouin, 1826)]

Thalamita pseudopoissoni Stephenson & Rees, 1967a: 90, fig. 33, pl. 8B; Stephenson, 1972a: 151; Stephenson, 1972b: 19, 50.

Material examined. – None.

Remarks. – *Thalamita pseudopossoni* was originally described by Stephenson & Rees (1967a) from Palau Is. (northeast of Ngabodongu), Sulu Archipelago and Gulf of Davao the Philippines. This species differs from *T. poissonii* by having short, stout, flared tip G1 (vs. G1 longer and the tip is recurved).

***Thalamita quadrilobata* Miers, 1884**

Thalamita quadrilobata Miers, 1884: 539, pl. XLVIII fig. B; Alcock, 1899: 84; Stephenson & Hudson, 1957: 349, figs. 2G, 3G, pl. 4 fig. 4, pls. 9M, 9F; Heath, 1973: 3 (key), 17, figs. 9f, 12f; Stephenson, 1972a: 151; Stephenson, 1972b: 18

(key), 51; Stephenson, 1976: 24; Poupin, 1996b: 36; Apel & Spiridonov, 1998: 260, figs. 77, 86.

Thalamita admeta var. F *quadrilobata* – Borradaile, 1903 a: 202.

Thalamita admetavar. E *intermedia* Borradaile, 1903: 202 [not *Thalamita intermedia* Miers, 1886]

Thalamita (*Pseudothalamitopsis*) *quadrilobata* – Guinot, 1985: 449 (list).

Thalamita borradailei Wee & Ng, 1995: 61-62. [replacement name for *T. intermedia* Borradaile, 1903].

Material examined. – Philippines: 1 ovig. female (18.2 × 11.1 mm) (ZRC), PANGLAO 2004, Panglao I., Alona reef, stn. B2, 5 m, reef slope, 31 May 2004; 2 males (22.5 × 14.1 mm, 14.5 × 9.1 mm), 1 female (14.1 × 8.9 mm) (ZRC), PANGLAO 2004, Panglao I., Arco Point, stn. B3, 8 m, base of reef slope, 31 May 2004; 1 male (15.5 × 9.5 mm) (ZRC), PANGLAO 2004: Panglao I., Alona Reef, stn. B1, 8-14 m, slope between reef patches, 30 May 2004.

Remarks. – According to Stephenson & Hudson (1957), the sixth somite of male abdomen is the shortest. However, in current specimens, the telson is the shortest. However, there are no other differences and I believe that is intraspecific variation.

***Thalamita sexlobata* Miers, 1886**

Thalamita sexlobata Miers, 1886: 196, pl. 15,16, figs. 2a-c; Henderson, 1893: 373; Alcock, 1899: 87; Stephenson, 1946: 136, fig. 32c-d; Stephenson & Hudson, 1957: 350, figs. 2B, 3B, pl. 5, fig. 1, pls. 8N, 10K; Crosnier, 1962: 117, figs. 195-

198; Ow-Yang, 1963: 126, pl. 26, figs. A-E; McNeill, 1968: 52; Stephenson, 1972: 151; Stephenson, 1975: 203; Lovett, 1981: 130, figs. 293a-c; Takeda, 1989: 156; Wee & Ng, 1995: 106, figs. 58A-E.

Thalamita sexlobata var. *plicatifrons* – De Man, 1902: 651.

Thalamita poissonii – Sakai, 1939: 17 (not *Thalamita poissonii* Audouin & Savigny, 1817).

Material examined. – Philippines: 1 male (6.7 × 4.4 mm) (ZRC), PANGLAO 2004, Bohol I., Baclayon Takot, stn. B13, 3-5 m, coral rubble, 15 Jun. 2004.

Remarks. – The Philippine record of this species can be found in Wee & Ng (1995).

Thalamita sima H. Milne Edwards, 1834

Thalamita sima H. Milne Edwards, 1834: 460; Walker, 1887: 110; De Man, 1888: 75; De Man, 1895: 564; Alcock, 1899: 81; Stimpson, 1907: 83, pl. 9, fig. 2; Rathbun, 1910: 365; Balss, 1922: 11; Hale, 1927: 151; Montgomery, 1931: 430; Shen, 1934: 54, figs. 17,18; Sakai, 1934: 304; Sakai, 1939: 42, pl. 51 fig. 3; Sakai, 1976: 379, pl. 130 fig. 3; Stephensen, 1946: 120, figs. 27a-g; Barnard, 1950: 175, fig. 33b; Edmondson, 1954: 258, figs. 32e-h; Stephenson & Hudson, 1957: 352, figs. 2C, 3C, pl. 5 fig. 2, pl. 8D, 9G; Crosnier, 1962: 111, fig. 181; Ow-Yang, 1963: 128, pl. 27, figs. A-F, 131, E1; McNeill, 1968: 53; Stephenson, 1972: 151; Stephenson, 1975: 203; Lovett, 1981: 130, figs. 295a-d; Dai et al., 1986: 234, pl. 31(4), fig. 138(1); Cariaso & Garcia, 1986: 200; Dai & Yang, 1991: 254, pl. 31(4), fig. 138(1);Wee & Ng, 1995: 108, fig. 59.

Portunus (*Thalamita*) *arcuatus* De Haan, 1835: 43, pl. 2, fig. 2, p1. 13 fig. 1.

Material examined. – None.

Remarks. – Cariaso & Garcia (1986) reported this species from Palawan, Bohol, Pangasinan, Sulu, Zambales and Mindoro of the Philippines.

Thalamita spinicarpa Wee & Ng, 1995*

Thalamita danae - Tweedie, 1950: 84 (part); Ow-Yang, 1963: 109 (part.) (not *Thalamita danae* Stimpson, 1858).

Thalamita spinicarpa Wee & Ng, 1995: 110, figs. 60-64.

Material examined. – Philippines: 1 male (35.4 × 21.3 mm) (ZRC), PANGLAO 2004, Panglao I., Sungcolan inlet, stn. R66, 1-3 m, channel between lagoon and the sea, 28 Jun. 2004; 1 ovig. female (31.8 × 19.3 mm), 1 females (29.7 × 17.7 mm) 9ZRC), PANGLAO 2004, Panglao I. Tagbilaran channel, stn. D13, 2-3 m, sand, 29 Jun. 2004.

Remarks. – This is a new record for the Philippines. *Thalamita spinicarpa* can easily be separated from *T. danae* by the presence of an additional spine on the upper surface of the carpus of cheliped (vs. no addition spine on carpus in *T. danae*) (Wee & Ng, 1995).

Thalamita spinimana Dana, 1852

Thalamita spinimana Dana, 1952: 283, pl. 17, fig. 18; A. Milne-Edwards, 1873: 165, pl. 4, fig. 5; De Man, 1888: 76, pl. 4, fig. 7; Lanchester, 1900: 749; Sakai, 1936: 162, pl. 12, fig. 1; Shen, 1937: 131, fig. 17; Stephenson & Hudson, 1957: 354, fig. 20, 30, pl. 5, fig. 3, pls. 8P, 9H; Ow-Yang, 1963: 131, pl. 28, figs. A-F, Bl, El, Fl;

Stephenson & Rees,1967: 95; McNeill, 1968:53; Stephenson, 1972:152, fig. 5; 1975:24; Stephenson, 1976: 203; Moosa, 1980: 72, fig. 6B; Lovett, 1981: 130,figs. 289a-c; Dai et al., 1986: 227, pl. 30(6), fig. 135(2); Dai & Yang, 1991: 248, 30(6), fig. 135(2).

Material examined. – Philippines: 1 male (43.1 × 27.5 mm), 1 female (54.8 × 34.6 mm) (ZRC), PANGLAO 2004, Panglao I., Sungcolan inlet, stn. R66, 1-3 m, channel between lagoon and the sea, 28 Jun. 2004; 1 female (18.2 × 11.9 mm) (ZRC), PANGLAO 2004, Pamilacan I., stn. S12, 6-8 m, coral plateau with fine sand, 14 Jun. 2004; 2 ovig. females (37.3 × 23.1 mm, 36.9 × 35.7 mm) (ZRC), PANGLAO 2004, Tagbilaran-Panglao channel, stn. D12, 2-4 m, mud sand, 28 Jun. 2004.

Remarks. – This species can be found in China, the Philippines, Singapore, Malaysia, Indonesia, Australia, New Caledonia (fide Wee & Ng, 1995).

Thalamita spinifera Borradaile, 1903

(Plate 3G)

Thalamita exetastica var. *spinifera* Borradaile, 1903: 203

Thalamita spinifera – Rathbun, 1906: 874; Edmondson, 1954: 269, figs. 41a-d, 42a; Crosnier, 1962: 1925, figs. 210-211, 214-215, pl. 11 fig. 1; Stephenson & Hudson, 1957: 317, 320; Stephenson & Rees, 1967a: 93, fig. 34; Stephenson, 1972: 151; Stephenson, 1976: 24; Sakai, 1976: 377, pl. 133 fig. 2; Wee & Ng, 1995: 116, figs. 65a-d; Moosa, 1996: 525, fig. 10e; Poupin, 1996a: 36.

Material examined. – Philippines: 1 male (32.4 × 22.0 mm) Philippines: NW coast of Panglao I. 80-300 fms, tangle net, coll: J Arbasto, Jan.-Mar. 2011; 1 male (15.7 × 10.9 mm,) 1 ovig. female (20.0 × 14.0 mm) (ZRC), PANGLAO 2004, Panglao I, Bolod, stn. T1, 83-102 m, mud and sponges, 30 May 2004; 1 female (24.4 × 17.1 mm) Panglao, Maribohoc Bay, coll. T.J. Arbasto, 100-300 m, Nov. 2003-Apr. 2004; 1 ovig. female (16.5 × 11.9 mm), 1 juv. female (8.7 × 6.8 mm) (ZRC 2001.0632), Bohol, Balicasag I., 50-500m, coll. local fishermen with tangle nets. 28 Nov 2001; 1 male (21.5 × 15.0 mm), 1 female (19.6 × 14.1 mm) (ZRC), PANGLAO 2004, West Pamilacan I., Cervera shoal, stn. T41, 110-112 m, 6 Jul. 2004.

Remarks. – This species is widely distributed from Madagasca, to Philippines, all the way to Hawaii (fide Stephenson, 1972b).

Thalamita spinimera Stephenson & Rees, 1967*

(Figs. 18, 19)

Thalamita spinimera Stephenson & Rees, 1967a: 95, fig. 35, pl. 9; Stephenson, 1975: 203; Chen, 1980: 133, fig. 16, pl. 4.

Material examined. – Philippines: 3 males (31.1 × 21.6 mm, 15.0 × 9.7 mm, 11.8 × 7.7 mm), 1 female (13.3 × 9.0 mm) (ZRC), PANGLAO 2004, Panglao I. Tangnan, stn. L40, 100-200 m, 24 Jun. 2004; 2 males (15.7 × 10.1 mm, 10.0 × 6.8 mm), 1 ovig. female (21.0 × 13.3 mm), 1 female (8.7 × 6.2 mm) (ZRC), north coast of Panglao, coll. J. Arbasto, Jul. 2005-May 2005.

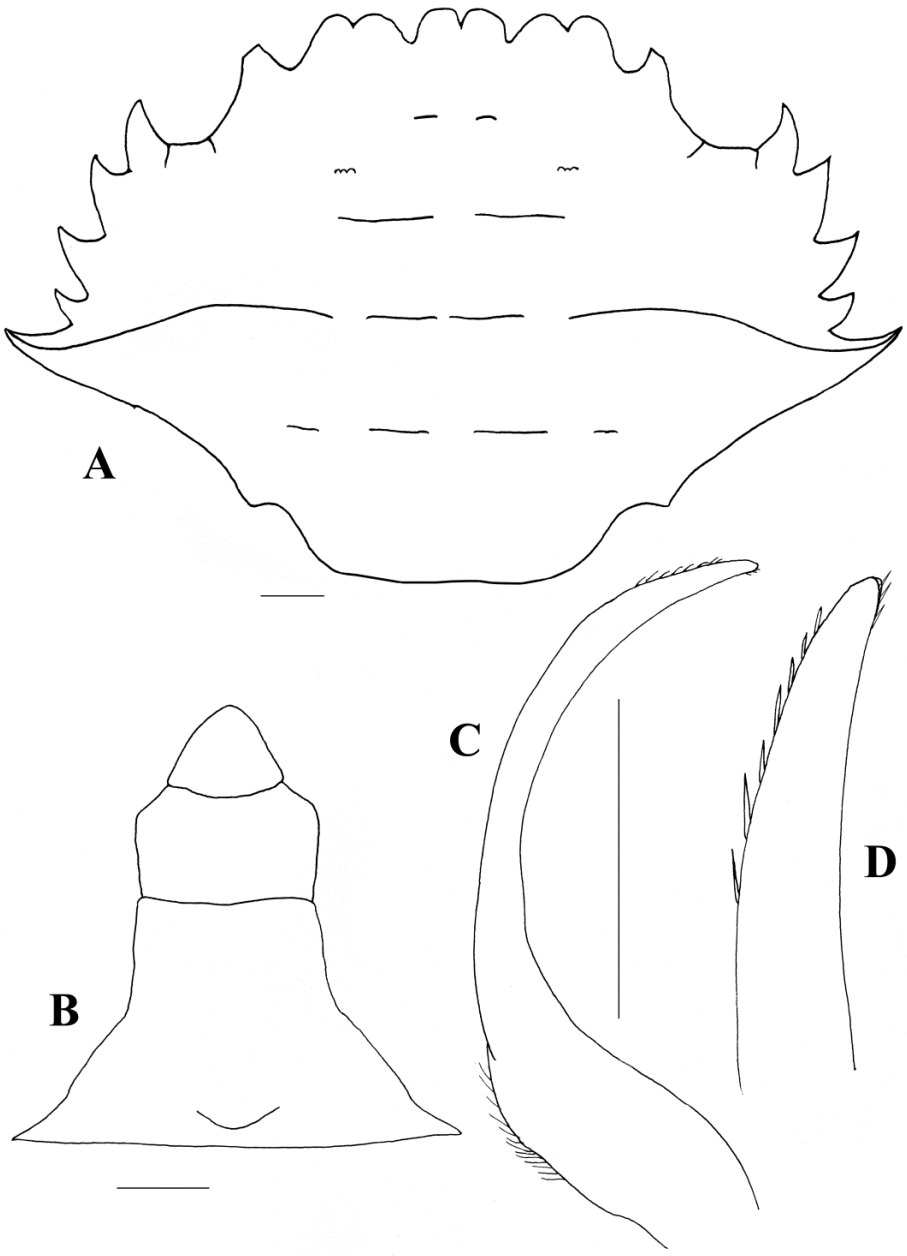


Fig. 18. *Thalamita spinimera* Stephenson & Rees, 1967. Male (15.0 × 9.7 mm) (PANGLAO 2004, stn. L40). A. Carapace. B. Abdomen; C. G1; D. Tip of the same G1. Scale = 1.0 mm.

Description. – Carapace about 1.4-1.6 times broader than long, granulated and covered with long sparsely setae. Frontal ridges short; protogastrics short, faint, or not discernable; mesogastrics straight or concave anteriorly, separated in midline, 2 cardiac ridges separated, 2 short conspicuous mesobranchials.

Six frontal teeth. Medians with rounded tips, most projecting, separated from submedians by deep broad notches. Inner supraorbital lobe narrow, sharp.

Basal antennal segment with a short crest bearing 3 sharp spines.

Chelipeds slightly equal, spinous. Anterior border of merus with 4 or 5 spines excluding small one at distal end, none on posterior border, 1 on ventral surface behind carpus articulation. Carpus with well-developed spine on inner angle, 3 spines at outer angle, 1 addition spine on upper surface. Manus with 5 spines including 1 at carpus articulation. Outer surface of hand with 1 carina composed of big round granules, termimating with spine before begining of immoveable finger.

Walking legs with unique spine on ventrodistal border of merus and manus of each leg. Carpus bearing similar spines on dorsodistal border. Dactylus tips sharp.

Natatory leg in dorsal view with a strong spine of distal border merus, and another smaller spine on posterodistal angle; merus has a third spine on ventrodistal border. Carpus with 1 strong spine on posterior margin. Posterior margin of propodus with 3-5 spines. Dactylus with pointed tip.

Male sith abdomen somite is about 1.6 times wider than long, with lateral margins divergent at basal 2/3, then bent angularly, convergent at distal third. Telson triangular, as broad as long. Somite 3 has a wide V-shape engraved mark. Abdomen of adult female covers almost whole thoracic sternum.

G1 gently curved, inner border with row of bristle near tip, few bristles at tip on outer margin.

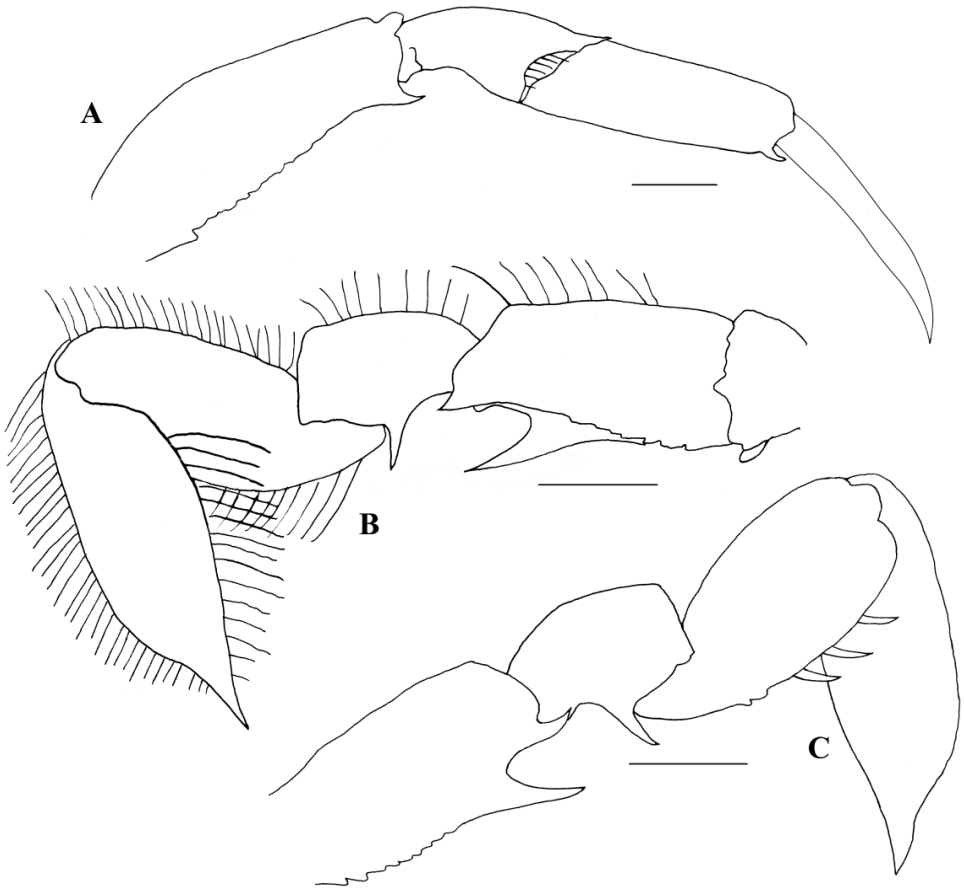


Fig. 19. *Thalamita spinimera* Stephenson & Rees, 1967. Male (15.0 × 9.7 mm) PANGLAO 2004, stn. L40. A. Third walking leg. B. Dorsal view of right natatory leg; C. Ventral view of natatory leg. Scale = 1.0 mm.

Remarks. – This is a new record for the Philippines. Stephenson & Rees (1967a) described *T. spinimera* based on one female holotype from Guam. Two other records, from Mollucas Islands (Stephenson, 1975) and Xisha Islands (Chen, 1980) were based on only a single female specimen each. Stephenson (1975) commented that the record from Mollucas Islands was the third specimen known, indicating that there is are a total four female specimens that had been reported, including the specimens from Xisha. Therefore, this is the first time several specimens have been collected

including males. The male specimens abdomen and G1 are illustrated and described.

Thalamita stephensoni Crosnier, 1962*

Thalamita stephensoni Crosnier, 1962: 140, figs. 241-248; Stephenson & Rees, 1967a: 98; Stephenson, 1972 (record only).

Material examined. – Philippines: 1 male (8.5 × 5.5 mm) (ZRC 2001.0632) Bohol, Balicasag I., 50-500m depth, coll. local fishermen with tangle nets, 28 Nov. 2001; 1 male (7.2 × 4.5 mm) (ZRC), PANGLAO 2004, Panglao I. SE Dauis, stn. D1, 2 m, muddy coarse sand with rubble, 3 Jun. 2004.

Remarks. – This is the first time this species has been recorded for the Philippines. This is the only one *Thalamita* species that has remarkable spoon-tip fingers on the chelipeds. The other groups of portunids with similar spoon-tip fingers are from the genus *Thalamitoides*.

Genus *Thalamitoides* A. Milne Edwards, 1869

Thalamitoides A. Milne Edwards, 1869: 16; Crosnier, 1962: 142; Stephenson, 1972b: 52.

Type species. – *Thalamitoides quadridens* A. Milne Edwards, 1869, by subsequent designation.

Thalamitoides quadridens A. Milne Edwards, 1869

(Plate 3H)

Thalamitoides quadridens A. Milne Edwards, 1869: 147, pl. 6, figs. 8-16; Edmonson, 1954: 270, figs. 42b, 43a-c; Crosnier, 1962: 144, figs. 249-251; Garth, 1964: 140 (record only); Stephenson & Rees, 1967a: 101, fig. 37; Griffin, 1969: 352; Heath, 1971; Stephenson, 1972: (record only).

Material examined. – Philippines: 2 males (16.0 × 8.5 mm, 8.6 × 4.9 mm) (ZRC), PANGLAO 2004, Panglao I., Napaling, stn. B9, 8-10 m, caves in the reef wall 8 Jun. 2004; 1 female (20.5 × 10.6 mm) (ZRC), PANGLAO 2004, Panglao I., Alona reef, stn. B2, 5 m, reef slope, 31 May 2004; 1 male (24.1 × 11.9 mm) (ZRC), PANGLAO 2004, Panglao I., Doljo point, stn. R51, 2-52 m, reef platform and wall, giant seafans in, 40-60 m, Jun.-Jul. 2004; 1 ovig. female (17.2 × 8.4 mm) (ZRC), PANGLAO 2004, Panglao I., Alona reef, stn. B2, 5 m, reef slope, 31 May 2004.

Remarks. – This species can be easily separated from its allied *T. tridens* as follows: a) the manus of cheliped with three spines at the distal (vs. one in *T. tridens*); b) the inner orbital lobe is narrower and curved (vs. wider and quite straight in *T. tridens*), c) the median and submedian frontal teeth are separated by a proportionately wider notch (vs. narrower); and d) two rows of spines on arm of cheliped (vs one ridge with spines, and an additional three spines on the side of the main ridge in *T. tridens*).

Thalamitoides tridens tridens A. Milne Edwards, 1869

Thalamitoides tridens A. Milne Edwards, 1869: 149, pl. 6 figs. 1-7; Ortmann, 1893: 86; Balss, 1938: 35; Crosnier, 1962: 143, fig. 250; Estampador, 1959: 71.

Material examined. – None.

Remarks. – The Philippine record was published by Estampador (1959).

QUESTIONABLE RECORDS

In addition to adding numerous records to the Philippine portunid fauna, the present work has also reviewed the existing records and have excluded three dubious species mentioned in earlier checklists:

1. *Portunus* (*Portunus*) *xantusii* (Stimpson, 1860), type locality: Cabo San Lucas, Baja California, Mexico. This species is found in the western coast of North America between Alaska and Mexico. Estampador (1959) recorded "*Neptunus xanthusii*" from Puerto Galera, Mindoro Island. Due to the loss of Estampador's collection, it is now impossible to re-examine that specimen and confirm its identity. Besides Estampador (1959), there was another record of this species from Indo-West Pacific (Arabian Gulf) by Mohammed & Al-Ssahd (1996), but Apel & Spiridonov (1998) were skeptical about the validity of that record, and argued that this species is limited to the eastern Pacific, particularly the western coast of North America. In the case of the Philippines, their position is also adopted here. For a proper description of this species, see Rathbun (1930).

2. *Thalamita cooperi* Borradaile, 1902, was originally reported from Maldives and Laccadives. Vannini (1983) recorded this species from the Philippines based on the record of its synonym *T. corrugata* Stephenson & Rees, 1961. But *T. corrugata* was later recognised as a valid species, and distinct from *T. cooperi*. There is no other record of this species around the

Philippine region, and the only record in the Philippines was invalid. Therefore, *T. cooperi* is discounted from the Philippines's checklist.

3. *Portunus* (*Portunus*) *trituberculatus* (Miers, 1876) was recorded for the Philippines by Estampador (1959). This common and commercially important species is reliably known only from Japan, China and Taiwan (see Sakai, 1970; Dai & Yang, 1991; Ng, 1998; Ng et al., 2001). There is no record in and beyond south of northern Taiwan. Several records of *P. trituberculatus* in India, Bay of Bengal and Red Sea by Stephenson & Rees (1967a, 1967b) have been discounted by Stephenson (1976) because those specimens were misidentified as *P. pelagicus* (Linnaeus, 1758). Therefore, it is very unlikely *P. trituberculatus* occurs in the Philippine area. The Philippine record of this species should be deleted unless there are new materials obtained from the area can confirm its presence.

With regards to *Portunus* (*Xiphonectes*) *hastatoides* Fabricius, 1798, which was considered as a widely distributed species recorded from South Africa (Barnard, 1950), Madagascar (Crosnier, 1962), Sri Lanka (Laurie, 1938), Australia (Stephenson & Campbell, 1960), China (Dai & Yang, 1991) and Japan (Sakai, 1939), my current and present study (see Chapter 4), shows that *P. hastatoides* is a species complex consisting of four cryptic species; and *P. hastatoides* sensu stricto is restricted to the Indian Ocean and Gulf of Thailand. All previous records of *P. hastatoides* probably are new and hereby described as *P. subtilis* sp. nov. (see more under *P. subtilis* in this thesis).

CHAPTER 4.

A REVISION OF THE *PORTUNUS* (*XIPHONECTES*) *HASTATOIDES* FABRICIUS, 1798 SPECIES COMPLEX

Introduction

Portunus (*Xiphonectes*) *hastatoides* Fabricius, 1798, is a small-sized portunid crab species (carapace width of adults less than 50 mm,) and often characterised by having a dark spot on the dactylus of the natatory leg (pereopod 5). *Portunus hastatoides* is widely distributed species in the Indo-West Pacific region, and has previously been reported from India (Fabricius, 1798), South Africa (Barnard, 1950), Madagascar (Crosnier, 1962), Persian Gulf (Apel & Spiridonov, 1998; Stephensen, 1946), Australia, New Caledonia (Moosa, 1995), Gulf of Thailand (Stephenson, 1967), China and Japan (Sakai, 1939; Stephenson & Rees, 1967a, Dai & Yang, 1991).

Portunus hastatoides is closely allied to five other species, forming a tight Indo-West Pacific group which share the following characters: a) small-sized (carapace widths of adults about 25-50 mm), b) presence of nine anterolateral teeth with the last one largest, c) the junction between the posterior and posterolateral borders of the carapace forming a distinct right angle or armed with a spine, d) anterior distal angle of the merus of the 3rd maxiliped produced into acute angle, e) posterior border of the merus of the cheliped is armed with two spines, f) and the male abdomen is distinctly T-shaped. The six species in this species group are *P. hastatoides* Fabricius, 1798, *P. arabicus* (Nobili, 1905), *P. pseudohastatoides* Yang & Tang, 2006,

P. dayawanensis Chen, 1986, *P. tweediei* (Shen, 1937) and *P. hastatoides unidens* (Laurie, 1906). Some studies have been carried out to clarify the taxonomy of these species: *P. hastatoides* vs. *P. arabicus* (cf. Apel & Spiridonov, 1998), *P. hastatoides* vs. *P. hastatoides unidens* (cf. Laurie, 1906), *P. hastatoides* vs. *P. tweediei* (cf. Shen, 1937), and *P. hastatoides* vs. *P. dayawanensis* and *P. pseudohastatoides* (cf. Wong et al., 2010). While studying three common portunid species in Hongkong and Taiwanese waters, Wong et al. (2010) found that their *P. hastatoides* specimens are different from the types of *P. hastatoides*, and suggested *P. hastatoides* is a cryptic species complex. Therefore, in this thesis, *P. hastatoides* sensu lato is applied to the broad concept of the species has been considered to date. *P. hastatoides* sensu stricto refers to the restricted concept of the species as defined by this study.

The Philippine portunoid fauna contains two species in this group which have been reported previously: *P. hastatoides* and *P. tweediei*. The present study of the *P. hastatoides* group was initially done to clarify the taxonomy of these species alone, but because it only made sense if all the species were also treated, a complete revision was necessary. This is especially so since the ZRC has a good holding of specimens of this species complex. We have also obtained *P. hastatoides* specimens throughout its known geographic range, including type specimens. The protocol used for this study is similar as the others, and has already been outlined in the Material and Methods section of this thesis.

Taxonomy

Portunus (*Xiphonectes*) *hastatoides* Fabricius, 1798 sensu stricto

(Figs. 20, 21, 25A, 26A, 27A, 28A)

Portunus hastatoides Fabricius, 1798: 368; Hashmi, 1964: 453; Stephenson, 1967: 15; Stephenson & Rees, 1967a: 27; Stephenson & Rees, 1967b: 14; Chhapgar, 1968: 612; Zarenkov, 1969: 14; Stephenson, 1972a: 136; Stephenson, 1972b: 14 (key), 40; Stephenson, 1975: 178; Stephenson, 1976: 16; Basson et al., 1977: 250; Kensley, 1981: 42 (list); Devi, 1993: 536; Spiridonov, 1994: 136; Moosa, 1995: 522; Wong et al., 2010: fig. 3A-B.

Neptunus (*Amphitrite*) *hastatoides* – Miers, 1886: 175.

Neptunus hastatoides – Henderson, 1893: 368.

Neptunus (*Hellenus*) *hastatoides* – Alcock, 1899: 38; Laurie, 1906: 414, fig. 8.

Material examined. – Lectotype (hereby designated): 1 male (41.7 × 20.5 mm) (ZMUC), Tranquebar, southeast India. Paralectotypes: 4 specimens (35.0 ×17.0 mm; 38.5 × 20.0 mm; 32.0 × 14.0 mm; 39.0 × 19.0 mm) (ZMUC), 2 specimens (36.0 × 19.0 mm; 39.0 × 17.0 mm) (ZMK) Others: 13 males (40.6 × 22.4 mm; 39.6 × 22.5 mm; 38.2 × 20.9 mm; 40.2 × 21.2 mm; 36.1 × 19.7 mm; 41.2 × 22.7 mm; 37.7 × 20.6 mm; 36.1 × 19.6 mm; 38.4 × 21.2 mm; 39.6 × 22.1 mm; 38.4 × 20.7 mm; 40.8 × 22 mm; 40.7 × 20.6 mm), 9 females (38.8 × 20.5 mm; 36.2 × 20.1 mm; 35.0 × 19.7 mm; 34.4 × 19.0 mm; 34.1 × 18.8 mm; 35.8 × 17.9 mm; 36.5 × 20.4 mm; 38.8 × 21.1 mm; 32.6 × 17.0 mm), 8 ovig. females (38.8 × 21 mm; 37.2 × 20.1 mm; 36.9 × 20.0 mm; 36.8 × 19.4 mm; 35.2 × 19.5 mm; 33.5 × 17.9 mm; 32.9 × 17.7 mm; 38.8 × 20.7 mm)

(ZRC 2000.1396), Penang: Teluk Bahang fishport, trawler (coastal catch from sea off NW Penang), coll. N. Sivasothi & K.L. Yeo, 25 Apr. 2000; 1 male (38.9 × 20.7 mm) (ZRC 2000.1418), southwestern Penang, fishing village at Gertak Sanggul, gillnet, coll. Siva & K.L. Yeo, 26 Apr. 2000; 1 female (31.9 × 16.3 mm) (ZRC 2000.0843), Thailand, Phuket, Pichai fishport (from Andaman Sea), coll. P.K.L. Ng et al., 3-6 May 2000; 10 males (44.1 × 22.4 mm; 43.8 × 23.5 mm; 44.5 × 23.6 mm; 46.5 × 24.2 mm; 41.9 × 22.9 mm); 7 females (36 × 18.7 mm; 35.6 × 18.7 mm; 33.5 × 17.6 mm; 31.9 × 16.2 mm; 36.5 × 18.6 mm; 32.8 × 16.9 mm; 25.8 × 13.2 mm), 2 ovig. females (34.0 × 17.1 mm; 31.4 × 15.3 mm) (ZRC 2000.0780), Thailand, Phuket, Pichai fishport (from Andaman Sea), coll. N.K. Ng & K.L. Yeo et al., 17-20 Jan. 2000; 5 males (43.7 × 24.3 mm; 41.9 × 23.4 mm; 45.9 × 24.4 mm; 43.0 × 23.1 mm; 41.5 × 22.3 mm), 2 ovig. females (44.8 × 23.0 mm; 39.7 × 20.2 mm) (ZRC 1984.349-362), South China Sea near Singapore, Horsburgh lighthouse, coll. H. Huat, 26 Nov. 1982 – 15 Dec. 1982.

Diagnosis. – Small-sized species, largest specimen 46.5 mm in carapace width (ZRC 2000.0780). Dorsal surface of carapace covered with small rounded granules, and short tomentum. Frontal margin with 4 lobes, median pair acute, subequal to submedian pair but relatively narrower; separated by deep V-shaped notch (fig. 25A). Anterolateral margin with 9 teeth, last tooth longest, spiniform. Junction between posterior border and posterolateral border of carapace produced to form prominent lateral spine (fig. 26A). In posterior view, posterior carapace margin almost straight, spine at posterolateral junction directed laterally or slightly dorsally (fig. 27A). Tip of dactylus of

natatory leg with permanent dark spot. G1 short, stout, tapering, strongly curved at about 2/3 of length from basal, forming ca. 90 degrees angle (fig. 28A).

Distribution. – India, Sri Lanka, Malaysia, Thailand, Singapore.

Remarks. – See discussion below.

***Portunus* (*Xiphonectes*) *spiridonovi* sp. nov.**

(Figs. 22, 25B, 26B, 27B, 28B)

Hellenus hastatoides – Barnard, 1950: 158-159; Crosnier, 1962: 68-69, figs. 96, 109, 117, 122-123. [not *Portunus hastatoides* Fabricius, 1798]

Material examined. – Holotype (Hereby designated): 1 male (33.4 × 16.0 mm) (ZRC 2009.0888a), South Africa, coll. S. Fennessy, 7 Dec. 2006. Paratypes: 1 female (29.0 × 13.2 mm), 2 males (35.2 × 16.4 mm; 33.4 × 15.6 mm) (ZRC 2009.0888b), same data as holotype.

Diagnosis. – Frontal margin with 4 rounded tip teeth. Median pair smaller, length is about half of submedian pair, notch between median teeth shallow, about half of length of these teeth (fig. 25B). Posterior-posterolateral junction forms acute spine, points sideways (fig. 26B); in posterior view, margin straight, spine curves up dorsally (fig. 27B). Dactylus of last leg without dark spot. G1 is tapering, strongly curved at about 2/3 of length from basal. Distal portion is slightly curved out in opposite direction (fig. 28B).

Etymology. – The species is named after Dr. Vassily A. Spiridonov, who has contributed extensively on the study of Portunoidea.

Distribution. – South Africa, Madagascar, Persian Gulf.

Remarks. – The figures and description of *P. hastatoides* by Barnard (1950: 158, figs. 30e-g) agree with the present material of *P. spiridonovi*, especially in the structure of the acute, up-turned or claw-like posterolateral spine. Crosnier's (1962) specimens of *P. hastatoides* from Madagascar probably also belong to *P. spiridonovi* because he noted that the junction between posterolateral and posterior borders has a prominent spine, and his figure of the G1 (Crosnier, 1962: fig. 117) also matches that of *P. spiridonovi* from South Africa.

***Portunus* (*Xiphonectes*) *subtilis* sp. nov.**

(Figs. 23, 25C, 26C, 27C, 28C)

Portunus hastatoides – Sakai, 1939: 391-392, pl. 47 fig. 1; Stephenson & Campbell, 1959: 101-102, figs. 2D, 3D, pl. 1 fig. 4, pl.4 figs 4D, 5D; Dai & Yang, 1991: 212 (key), 216, pl. 26 (3), fig. 114 (2); Yang et al., 2012: 139-143, fig. 52, pl. IX: 2. [not *Portunus hastatoides* Fabricius, 1798]

Material examined. – Holotype: male (35.1 × 17.3 mm) (ZRC 2003.0527), stn. EA-TT06, Indonesia, Anambas, Teluk Tarempa, coll. Anambas Expedition, 14 Mar. 2002. Paratype: 1 female (34.8 × 17.2 mm) (ZRC 2003.0527), same data

as holotype. Other material examined. – 1 males (36.9 × 16.7 mm), 1 juv. male (25 × 9.4 mm) (ZRC 1999.0219.2), China, Tungdu market, Fujian Province, coll. Cai & Ng, 18 Nov. 1998; 1 broken juv. male (ZRC 2000.0020), Thailand, Chonburi Province, Siracha port, coll. P.K.L. Ng, Nov. 1999; 4 males (36.5 × 18.8 mm; 37.3 × 18.0 mm; 30.4 × 15.1 mm; 32.5 × 15.2 mm), 2 females (32.5 × 15.5 mm; 35.1 × 17.9 mm), 1 broken female, 2 ovig. females (33.8 × 15.6 mm; 32.0 × 14.8 mm) (ZRC 2003.0528), stn. EA-TT08, Indonesia, Natuna, westcoast of Pulau Bunguran, coll. Anambas Expedition, 18 Mar. 2002; 1 juv. male (19.0 × 8.7 mm), 1 juv. female (22.0 × 9.6 mm) (ZRC 1993.134-135), Singapore, Pulau Semakau, coll. P.K.L. Ng, 1991; 3 males (41.7 × 20.0 mm; 46.7 × 23.5 mm; 38.0 × 18.3 mm), 2 females (45.0 × 22.1 mm; 40.2 × 20.2 mm) (ZRC 2012.0005), Australia, Queensland, Morton Bay; 5 males (largest 36.1 × 17.3 mm), 1 female (QM 2197-2203), Australia, Queensland, Gulf of Carpenteria, southeast of Wellesley Islands, trawled (Gulf prawn survey), coll. I. Kirkegeerd, 13 Nov. 1964; 1 female (36.0 × 15.5 mm) (ZRC 1965.10.21.25), Australia, Linderman Island, Aug. 1935.

Diagnosis. – Frontal margin with 4 median teeth, median pair short, half length of laterals, notch between median pair shallow (fig. 25C). Posterior-posterolateral junction with spine pointed posterolaterally (fig. 26C). Posterior margin gently curved in dorsal view (fig. 26C). In posterior view, margin straight or sinuous, spine at posterior-posterolateral junction points dorsally (fig. 27C). Dactylus of last leg with dark spot. G1 tapering, gently curved anterolaterally at middle of length (fig. 28C).

Distribution. – Australia, Indonesia, Thailand, China, Japan.

Etymology. – This species is the closest to *P. hastatoides* sensu stricto, and has an overlapping distribution in the Gulf of Thailand area. The differences between the two species are relatively small but consistent, with the name meaning “slightly”. Gender masculine.

Remarks. – The current collection has five ethanol preserved specimens from Queenland, Australia (ZRC 2012.0005) well with no spot on the dactylus of last leg. The absence of a dark spot on the dactylus of last leg might be a variation of this species or possibly because they are badly faded, but we can only confirm this after we find fresh specimens.

Specimens from China (ZRC 1999.0219.2) have a straight posterior margin in posterior view, resembling *P. spiridonovi* (fig. 27B), rather than fig. 26C. But until we have more evidence, we tentatively treat these specimens as *P. subtilis*.

Shen (1937: fig. 5a) shows clearly that specimens have spine at postlateral junction and G1 matched with *P. subtilis*. They have a distinct dark spot on the dactylus of the last leg.

Yang & Tang (2006) compared *P. pseudohastatoides* to specimens of *Portunus hastatoides* from the South China Sea which is deposited in the Beijing Natural History Museum (BNHM). Based on the figure by the authors (Yang & Tang, 2006: fig. 3), we believe that their “*P. hastatoides*” is actually *P. subtilis* species, which also agrees with the known range.

Portunus (*Xiphonectes*) *shihi* sp. nov.

(Figs. 24, 25D, 26D, 27D, 28D)

Portunus hastatoides – Wong et al., 2010: 669, figs. 1A-D, 2A, 2B, 3C, 3D. [not *Portunus hastatoides* Fabricius, 1798]

Material examined. – Holotype (here designated): male (32.0 × 16.7 mm) (1995.6.29) (ZRC), Taiwan, Mi-Tou (southwestern coast of Taiwan), trawled at 20 m, Aug. 1994-Jul. 1995. Paratypes – 4 females (32.6 × 16 mm; 30.2 × 15.6 mm; 29.6 × 14.8 mm; 27.6 × 13.8 mm) (ZRC), same data as holotype; Other material examined. – 1 male (26.4 × 13.4 mm), 4 females (largest 27.2 × 14.1 mm) (ZRC 1995.5.20), Taiwan, Jong-Yun (southwestern coast of Taiwan), trawled at 10 m, Aug. 1994-Jul. 1995; 2 males (30.8 × 15.7 mm; 28.4 × 14.4 mm), 2 females (33.0 × 16.5 mm; 26.7 × 12.8 mm) (ZRC), Taiwan, Pingtung county, Donggang fish market, 4 Jun. 1992.

Diagnosis. – Frontal margin with 4 rounded teeth, median teeth shorter, about half length of laterals. Notch between median teeth short, shallow (fig. 25D). Posterior margin of male in dorsal view somewhat curved, more prominent in some specimens with somewhat angular bend (fig. 26D). Posterior-posterolateral junction with spine pointed posterolaterally (fig. 26D). In posterior view, margin sinuous, curved dorsally from center toward posterior-posterolateral junction (fig. 27D). Dactylus of last leg without dark spot. G1 tapering, gently curved anterolaterally at half of length from base, tip slightly bent in opposite direction (fig. 28D).

Etymology. – This species is named after Dr. Shih Hsi-Te, a prominent Taiwanese brachyuran researcher.

Remarks. – In some male specimens, somite 3 of the abdomen forms a somewhat broader flange than in other species of *Portunus hastatoides* sensu lato group. Wong et al. (2010) reported that all *P. hastatoides* specimens sensu lato in their study were collected from Taiwan Strait and Hong Kong have no dark spot on dactylus of last leg. Based on photos provided in that study, their specimens are also probably *P. shihi* sp. nov. as well.

Distribution. – China, Taiwan.

***Portunus* (*Xiphonectes*) *arabicus* (Nobili, 1905)**

(Figs. 29, 32A)

Neptunus (*Hellenus*) *arabicus* Nobili, 1905: 163; Nobili, 1906 a: 115, pl. 5 figs. 22-22a; Nobili, 1906b: 190 (key), 191; Stephensen, 1946: 121, figs. 26A-C.

Neptunus (*Hellenus*) *andersoni* – Alcock, 1899: 39; Stephensen, 1946: 122. [not *Neptunus* (*Hellenus*) *andersoni* De Man, 1887]

Lupa arabica – Laurie 1915: 411 (list).

Portunus acerbiterminalis Stephenson & Rees, 1967a: 14, fig. 1 pl. 1B; Stephenson & Rees, 1967b: 287; Stephenson, 1972b: 15 (key), 38 (part: records from Saudi Arabia and East Africa).

Portunus arabicus – Stephenson, 1976: 15; Apel & Spiridonov, 1998: 281, figs. 95, 98-99, 106.

Not *Portunus acerbiterminalis* – Stephenson, 1972a: 134; Stephenson, 1972b: 38 (part: record from India). [= *P. hastatoides* Fabricius, 1798].

Material examined. – 1 paralectotype female (MNHN B.5927), Abu Dhabi, Saudi Arabia.

Diagnosis. – Carapace pubescent, with conspicuously elevated granular regions and tubercles. 9 teeth on anterolateral border of carapace. Frontal margin with 4 teeth, median pair smaller, less prominent than submedian pair. Posterolateral junctions of carapace forming obtuse or right angle, without spine. Posterior border convex posteriorly (fig. 29). G1 curved, tapering with pointed tip slightly curved upwards (fig. 32A).

Distribution. – From the north-east coast of Somalia, the Gulf of Aden, southern Red Sea and Socotra to the Arabian Gulf (fide Apel & Spiridonov, 1998).

Remarks. – *Portunus arabicus* is mainly distinguished from *P. hastatoides* sensu lato by the relative coarser granulation of the carapace and the obtuse or right angle posterolateral junctions, which does not have spine (at a sharp right angle with a spine in *P. hastatoides* sensu lato).

Portunus (*Xiphonectes*) *dayawanensis* Chen, 1986

(Figs. 30, 32C)

Portunus dayawanensis Chen, 1986: 84, fig. 1; Wong et al., 2010: 674, figs. 1E-I, 2C, D.

Portunus (*Xiphonectes*) *dayawanensis* – Ng et al., 2008: 152.

Material examined. – Holotype: male (26.4 × 11.3 mm) (MBMCAS C00989), China, Guangdong Province, Dayawan, Sanmen Island, 24 Dec. 1980; Paratype: 3 females (29.2 × 14.5 mm; 25.0 × 11.2 mm; 16.8 × 7.3 mm) (MBMCAS C00990), China, Guangdong Province, Dayawan, Sanmen Island, 24 Dec. 1980.

Diagnosis. – Carapace glabrous. Frontal margin with 3 bluntly rounded teeth, median about half size of lateral. Anterolateral margin of carapace with 9 teeth, last one longest, straight, points laterally. Posterior-posterolateral junction armed with spine (fig. 30). Sixth somite of male abdomen slender, basal breadth about twice distal end. Telson elongate ovate. Male G1 stout, moderately strongly curved, extremity with few spines (fig. 32C).

Distribution. – Sanmen Island, Daya Bay (= Dayawan), Guangdong Province, China (type locality), and Tolo Harbour, Hong Kong.

Remarks. – See discussion below.

Portunus (*Xiphonectes*) *pseudohastatoides* Yang & Tang, 2006

(Fig. 32D)

Portunus pseudohastatoides Yang & Tang, 2006: 691, figs. 1, 2; Wong et al., 2010: 676, figs. 1E-N, 2E, F.

Portunus (*Xiphonectes*) *pseudohastatoides* – Ng et al., 2008: 152.

Portunus hastatoides – Yu, 1979: 48, fig. 5; Huang & Yu, 1997: 68 (part.). [not *Portunus hastatoides* Fabricius, 1798]

Material examined. – 5 males (36.8 × 18.7 mm; 35.0 × 18.7 mm; 36.2 × 18.3 mm; 35.7 × 18.1 mm; 36.2 × 19.5 mm) (ZRC 1994.10.3), Taiwan, Taichung (northwestern coast of Taiwan), trawled at 20 m; 2 males (larger 32.6 × 16.6 mm), 2 females (35.0 × 17.2 mm; 29.7 × 14.9 mm), 1 ovig. female (32 × 15.8 mm) (ZRC 1995.7.21), Taiwan, Bort-Zae-Liau (northwestern coast of Taiwan), trawled at 10 m; 3 males (38.6 × 19.5 mm; 37.4 × 18.2 mm; 33.5 × 17.0 mm), 2 females (34.0 × 16.8 mm; 32.4 × 16.0 mm) (ZRC 1994.8.20) Taiwan, Ma-Sha-Gou (western coast of Taiwan), trawled at 70 m; 3 males, 2 ovig. females (36.5 × 18.0 mm; 32.1 × 15.1 mm) (ZRC 1994.9.14), Taiwan, Ma-Sha-Gou (western coast of Taiwan), trawled at 70 m; 1 male (43 × 21.5 mm) (ZRC 1997.762), China, near Macau, coll. Hong Kong Chinese University, 1996; 1 male (39.4 × 19.2 mm), Vietnam, Nam Dinh Province, from fishermen near Xuan Thuy National Park, 7 Aug. 2007; 1 male (28.1 × 14.3 mm) (ZRC Y821.2), Malaysia, Johor, Pontian, coll. P. K. L. Ng, Feb. 1993; 3 males (27.9 × 12.5 mm; 24.2 × 11.0 mm; 26 × 12.3 mm), 2 females (27.2 × 12.6 mm, 27.5 × 12.0 mm), 2 juv. males (ZRC 1965.10.21.14-20), Malaysia, Selangor, Morib.

Diagnosis. – Frontal margin with 4 teeth. Median teeth as long as submedian pair, separated by a V-shape notch, notch depth is about half length of median teeth. Posterior-posterolateral junction with spine, pointed posterolaterally. Dactylus of last leg with dark spot. G1 stout; neck slender, tapering; tip with spoon-shaped opening, surrounded by about 10 spines directed slightly backwards on each side of opening (fig. 32D).

Distribution. – Guangxi Province, Guangdong Province (South China: type locality), Hong Kong, west coast (Taiwan Strait) and northeastern Taiwan, Vietnam, Malaysia.

Remarks. – All specimens used in this study have dark spot on dactylus of last leg, but Wong et al. (2010) has noted that the dark spot is inconsistent in their specimen, some specimens lacking a dark spot but this may have been due to loss and they may have mixed some of their material with *P. shihi* sp. nov.

***Portunus* (*Xiphonectes*) *unidens* Laurie, 1906**

(Figs. 31, 32B)

Neptunus (*Hellenus*) *hastatoides* var. *unidens* Laurie, 1906: 414.

Neptunus (*Hellenus*) *tweediei* Shen, 1937: 109, figs. 6, 8c, 8d.

Material examined. – Holotype: male (24.5 × 11.5 mm, both chelipeds missing) (NHM 1907.5.22.309), coral reefs, Gulf of Manaar, Sri Lanka, coll. Presd: W.A. Herdman. Paratypes: 1 male (29.9 × 14.3 mm), 1 female (25 × 12.2 mm) (NHM 1937.11.15.170-171), Siglap, Singapore. Presd: M.W.F.

Tweedie; 3 males (25.4 × 11.4 mm; 25.9 × 12.0 mm; 27.7 × 11.9 mm), 1 female (23.2 × 10.3 mm) (ZRC 1999.0796), Thailand, Songkhla fishing port, coll. H.H. Tan, 27 Oct. 1998; 7 males, 1 female (25.8 × 11.2 mm), 2 ovig. females (28.0 × 12.2 mm; 22.5 × 0.98 mm) (ZRC 2000.0934.2), Thailand, Gulf of Thailand, Chonburi, Si Racha fishport, 20 m depth, coll. P.K.L. Ng et al., 22 Feb. 2000; 2 males (larger 26.3 × 11.6 mm) (ZRC Y821.1), Malaysia, Johor, Pontian, coll. P.K.L. Ng, Feb. 1993.

Diagnosis. – Carapace with rounded granules surface. Regions moderately well defined, gastric, cardiac, lateral, and median postcardiac regions elevated, separated by deep grooves (fig. 31). Frontal margin with 3 blunt triangle teeth. Median tooth smaller, less prominent than 2 lateral teeth. Anterolateral border 9 nine teeth, last one very long, slightly pointed posterolaterally. Posterior-posterolateral junction of carapace with spine, pointed posterolaterally. Manus of cheliped with 3 or 4 spines on anterior border, 2 on posterior border. Carpus bears 2 spines. Merus with 2 spines, 1 on articulation with carpus and 1 at inner distal angle. Posterodistal border of merus of last leg serrated, dactylus without dark spot. Sixth somite of male abdomen with sides parallel from base to half or two-third of length, convergent at distal part. G1 distinctly becomes narrower after one-third of length from base, distal part elongate (fig. 32B).

Distribution. – India, Singapore, Malaysia, Gulf of Thailand.

Remarks. – *Neptunus* (*Hellenus*) *hastatoides unidens* Laurie, 1906, was originally described from one male specimen collected from the Gulf of

Manaar in Sri Lanka. The type specimen is missing both chelipeds, and Laurie had difficulty in deciding its identity. Therefore, he remarked that it may just be a variant of *Neptunus* (*Hellenus*) *hastatoides* Fabricius, 1789. Stephenson & Campbell (1959) treated *Neptunus* (*Hellenus*) *hastatoides unidens* Laurie, 1906, as a junior subjective synonym of *Portunus* (*Xiphonectes*) *hastatoides* Fabricius, 1798, but did not elaborate. The author has re-examined the type specimen of *Neptunus* (*Hellenus*) *hastatoides unidens* and confirmed that it is not the same species as *Portunus hastatoides* Fabricius, 1789. *Neptunus* (*Hellenus*) *hastatoides unidens* is clearly different from *P*. (*X*.) *hastatoides* in having an elongated G1 (fig. 32B) (vs. relatively short and stout, fig. 27A), no black spot on the dactylus of the natatory legs (vs. presence of a dark spot) and having three frontal teeth (vs. four frontal teeth). Thus, *Neptunus* (*Hellenus*) *hastatoides unidens* Laurie, 1906, is a valid species.

In 1937, Shen described a new species from Singapore – *Neptunus* (*Hellenus*) *tweediei*. This species was described as follows: "front cut into three teeth, the median one is smaller than the laterals; the last anterolateral tooth is long, directed slightly postero-laterally; and mostly similar to *N*. (*H*.) *hastatoides* Fabricius, 1798" (Shen, 1937). Shen noted that they are distinguishable from which species: a) front cut into three teeth (vs. four), b) dactylus of last legs without dark spot (vs. have dark spot), and c) the G1 is more curved (vs. less curved) (Shen, 1937: 109, figs. 8c vs. 8g).

The present comparisons demonstrate that *Neptunus* (*Hellenus*) *hastatoides unidens* Laurie, 1906, and *Neptunus* (*Hellenus*) *tweediei* Shen, 1937, are actually subjective synonyms. Interestingly, a label with the two syntypes of *N*. (*H*.) *tweediei* states that these specimens are *Portunus unidens*.

Clearly, someone earlier had compared the types of both species in the NHM, and realised they were identical, although nothing was published to this effect. As *Neptunus* (*Hellenus*) *tweediei* Shen, 1937, was described later than *Neptunus* (*Hellenus*) *hastatoides unidens* Laurie, 1906, it becomes a junior synonym of *Neptunus* (*Hellenus*) *hastatoides unidens* and the correct name of this species now is *Portunus* (*Xiphonectes*) *unidens* Laurie, 1906.

Portunus trilobatus Stephenson, 1972, is another species which has not been studied. Based on the original description and figure provided by Stephenson (1972: fig. 1), this species closely resembles *P. unidens.* However as we have not seen the type specimens of *P. trilobatus*, its identity is still unclear and we prefer not to treat further for the time being.

Incertae sedis

The four species *P. hastatoides* sensu stricto, *P. spiridonovi*, *P. subtilis*, and *P. shihi* are very similar to each other, and the G1 shape is a very important character to identify them apart. In our study, the angle of view of G1 when examined or photographed had to be standardised or they will look different. Therefore, in many cases, we are not 100% confident to judge G1 shapes in figures and drawing from literature alone.

The following records are attributed to *P. hastatoides* sensu lato. However, due to a lack of description or specimens, it is not possible to determine which of the four species the description is based on. Hence they are listed here as incertae sedis.

Portunus hastatoides – McNeill, 1968: 55; Tirmizi & Kazmi, 1996: 21-23, figs 9A-F.

Neptunus (*Hellenus*) *hastatoides* – Chopra, 1935: 477, fig. 4.

Neptunus (*Amphitrite*) *hastatoides* – De Haan, 1833: pl. 1 fig. 3; De Haan 1835: 39-40 [specimens are collected from Japan but based on his description and figures, it could either be *P. subtilis* or *P. shihi*]; Miers, 1884a: 183 (list), 229 [specimens from Indian Ocean, Australia and Hong Kong, including others without definite locality, from the collections of H.M.S. Herald and H.M.S Samarang; potentially includes some or all of the four species]; Stimpson, 1858: 38 [specimens from Japan could be either *P. subtilis* or *P. shihi*].

Neptunus hastatoides – A. Milne-Edwards, 1861: 332, 339 [specimens from Japan, China and India, probably mixed]; Tirmizi & Kazmi, 1996: fig. 9 [specimens from Pakistan have a carapace which has a long last anterolateral teeth and sharp spine on the posterolateral junction which points posterolaterally. The dark spot on the dactylus of the natatory leg was not documented and the figures did not show that. Based on locality, the Pakistani material is *P. hastatoides* sensu stricto. But according to their figures, the G1 resembles that of *P. subtilis*].

Portunus (*Xiphonectes*) *hastatoides.* – Sakai, 1976: 337, 344, pl. 119 fig. 2.

Portunus (*Hellenus*) *hastatoides* – Nobili, 1905c: 11.

Neptunus (*Hellenus*) *hastatoides* – Stephensen, 1946: 122-123 [specimens from Iranian Gulf (Iranian Gulf, Strait of Hormuz, Gulf Oman) and he noted that G1s and G2s of specimens from Iranian Gulf agree excellently with the figure of *P. hastatoides* in Shen (1937: figs. 8g-h) which is here *P. shihi*. If that species is really *P. shihi*, it means the most western range is Iranian Gulf, which seems unlikely. On the basis of

geography, it is more likely *P. spiridonovi* or *P. hastatoides* sensu stricto as these populations also from are the Indian Ocean].

Discussion

Yang & Tang (2006) compared their new species, *P. pseudohastatoides*, with the *P. hastatoides* figured in Crosnier (1962: figs. 96, 109, 122, 123) and in Stephenson & Campbell (1959: figs. 2D, 3D, pl.1 fig. 4, pl. 4 fig. D). However, according to the present study, it shows that Yang & Tang actually compared *P. pseudohastatoides* to two different species, *P. spiridonovi* (in Crosnier, 1962) and *P. subtilis* (in Stephenson & Campbell, 1959). According to the authors, the posterolateral margin is convex in *P. pseudohastatoides*, but concave in *P. hastatoides* (cf. Yang & Tang, 2006). However, we can see this margin is actually convex in our specimens [*P. hastatoides* sensu stricto (fig. 19), *P. spiridonovi* (fig. 21), *P. subtilis* (fig. 22)], so this character is not reliable. Wong et al. (2010) keyed out the differences between *P. pseudohastatoides* and *P. shihi* (as *P. hastatoides*), noting that the former species has the median frontal teeth as long as the laterals (vs. median teeth shorter than laterals) and with a slender G1 that has an opening which is spatuliform (vs. proportionately less slender with a tapering tip G1). The median teeth character is correct for *P. shihi*, *P. spiridonovi* and *P. subtilis*, but not *P. hastatoides* sensu stricto (fig. 24). Therefore, the G1 shape remains the most reliable character to distinguish *P. pseudohastatoides* from all four species in the group *P. hastatoides* sensu lato.

Fig. 20. *Portunus* (*Xiphonectes*) *hastatoides* Fabricius, 1798, lectotype male (41.7 × 20.5 mm) (ZMUC). Scale = 5.0 mm.

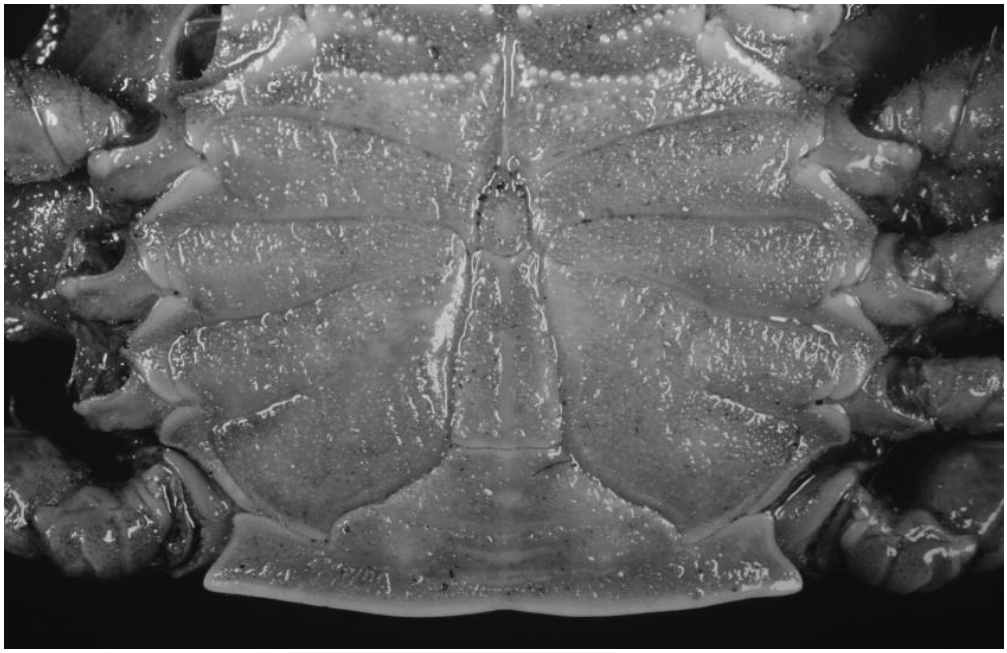


Fig. 21. Male abdomen. *Portunus* (*Xiphonectes*) *hastatoides* Fabricius, 1798, lectotype male (41.7 × 20.5 mm) (ZMUC).

Fig. 22. *Portunus spiridonovi* sp. nov., holotype male (33.4 × 16.0 mm) (ZRC 2009.0888). Scale = 5.0 mm.

Fig. 23. *Portunus subtilis* sp. nov., holotype male (35.1 × 17.3 mm) (ZRC 2003.0527). Scale = 5.0 mm.

Fig. 24. *Portunus shihi* sp. nov., holotype male (32 × 16.7 mm) (1995.6.29) (ZRC). Scale = 5.0 mm.

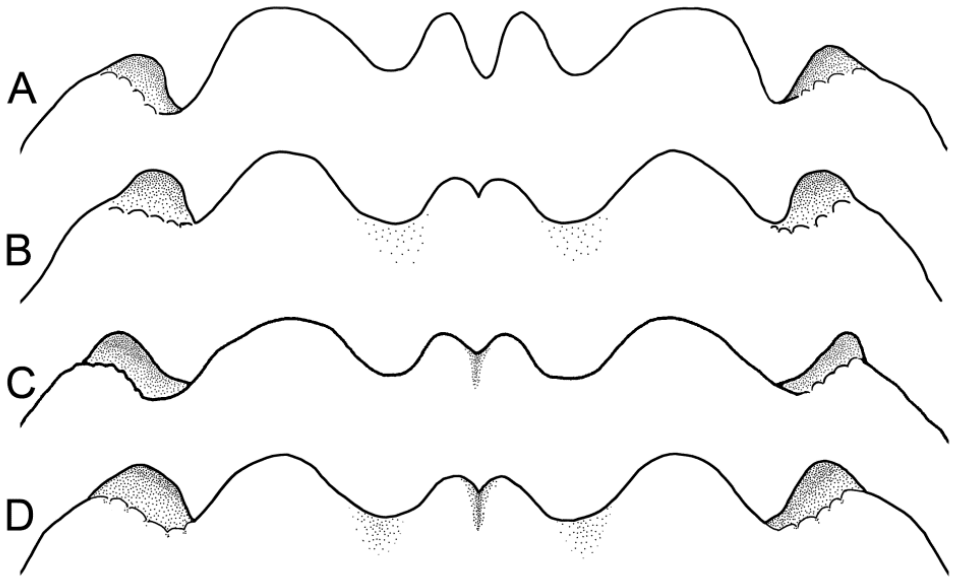


Fig. 25. *Portunus hastatoides* complex. Dorsal view of frontal margin of the carapace. A. *Portunus hastatoides* sensu stricto, lectotype male (41.7 × 20.5 mm) (ZMUC); B. *Portunus spiridonovi* sp. nov., holotype male (33.4 × 16.0 mm) (ZRC 2009.0888); C. *Portunus subtilis* sp. nov., holotype male (35.1 × 17.3 mm) (ZRC 2003.0527); D. *Portunus shihi* sp. nov., holotype male (32.0 × 16.7 mm) (ZRC 1995.6.29).

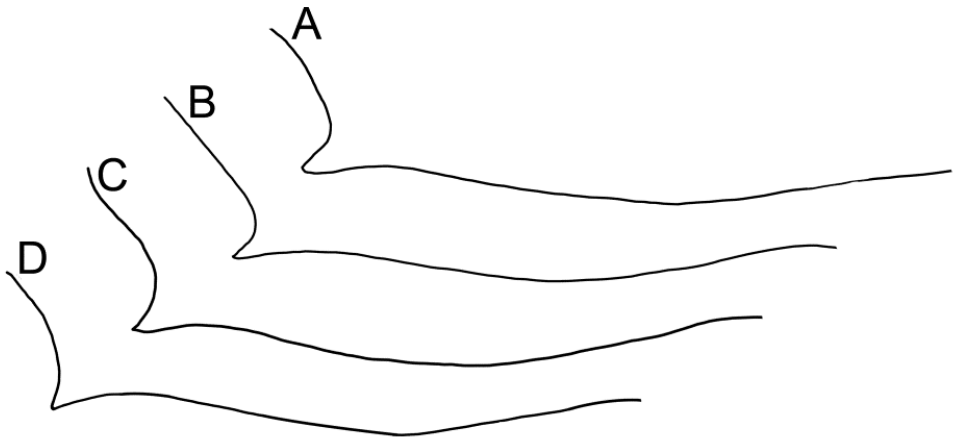


Fig. 26. *Portunus hastatoides* complex. Dorsal view of posterior margin of the carapace. A. *Portunus hastatoides* sensu stricto, lectotype male (41.7 × 20.5 mm) (ZMUC); B. *Portunus spiridonovi* sp. nov., holotype male (33.4 × 16.0 mm) (ZRC 2009.0888); C. *Portunus subtilis* sp. nov., holotype male (35.1 × 17.3 mm) (ZRC 2003.0527); D. *Portunus shihi* sp. nov., holotype male (32.0 × 16.7 mm) (ZRC 1995.6.29).

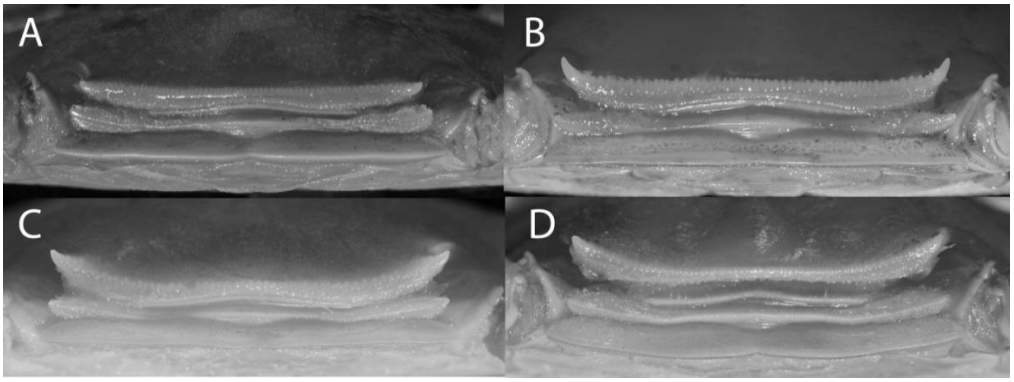


Fig. 27. *Portunus hastatoides* complex. Lateral view of posterior border of the carapace. A. *Portunus hastatoides* sensu stricto, male (40.6 × 22.4 mm) (ZRC 2000.1396); B. *spiridonovi* sp. nov. , holotype male (33.4 × 16 mm) (ZRC 2009.0888); C. *Portunus subtilis* sp. nov. (35.1 × 17.3 mm) (ZRC 2003.0527); D. *Portunus shihi* sp. nov., holotype male (32.0 × 16.7 mm) (ZRC 1995.6.29).

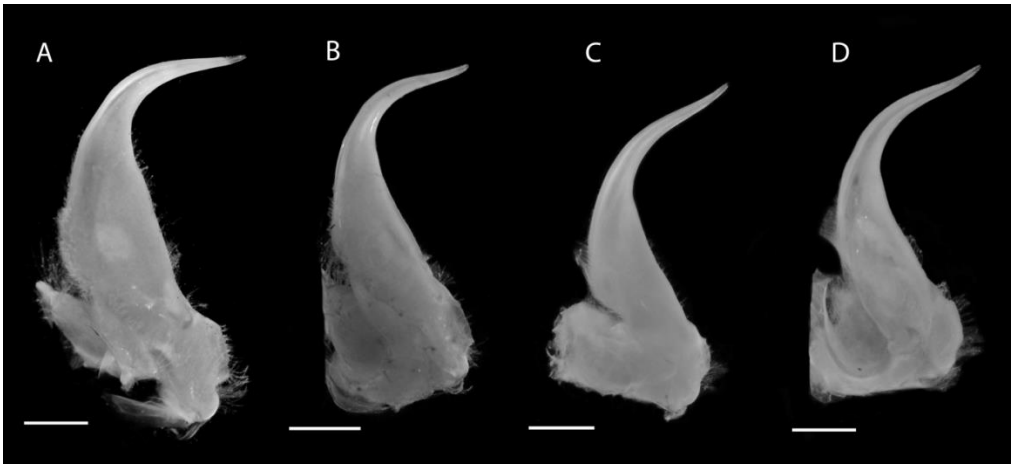


Fig. 28. Comparison of G1s of *Portunus hastatoides* complex species. A. *Portunus hastatoides* sensu stricto (40.6 × 22.4 mm) (ZRC 2000.1396); B. *Portunus spiridonovi* sp. nov., holotype male (33.4 × 16 mm) (ZRC 2009.0888); C. *Portunus subtilis* sp. nov., holotype male (35.1 × 17.3 mm) (ZRC 2003.0527); D. *Portunus shihi* sp. nov., holotype male (32 × 16.7 mm) (ZRC)(1995.6.29). Scale = 1.0 mm.

Fig. 29. *Portunus* (*Xiphonectes*) *arabicus* (Nobili, 1905). Paralectotype female (MNHN B.5927). (Photograph: T. Naruse).

Fig. 30. *Portunus* (*Xiphonectes*) *dayawanensis* Chen, 1986. Holotype male (26.4 × 11.3 mm) (MBMCAS C00989). Scale = 5.0 mm.

Fig. 31. *Portunus* (*Xiphonectes*) *unidens* Laurie, 1906. Holotype male (24.5 × 11.5 mm) (NHM 1907.5.22.309). Scale = 5.0 mm.

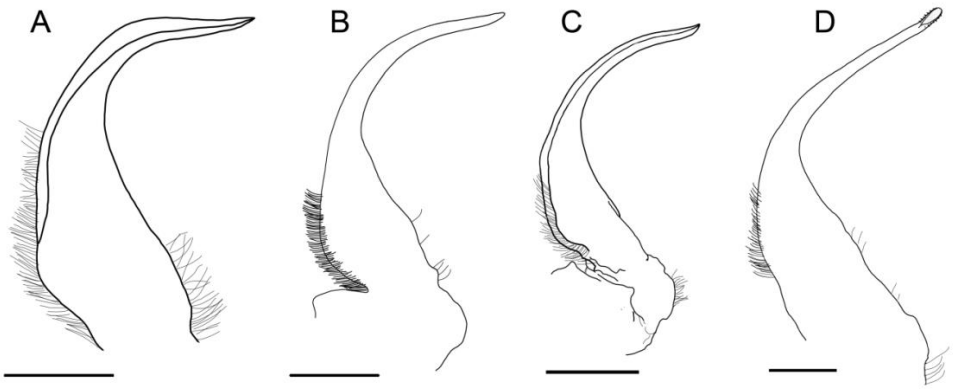


Fig. 32. Comparision of G1s of allied species of the *P. hastatoides* complex. A. *Portunus* (*Xiphonectes*) *arabicus* (Nobili, 1905) (adapted from Apel & Spiridonov, 1998: Fig. 95e); B. *Portunus* (*Xiphonectes*) *unidens* Laurie, 1906, (30.2 ×13.3 mm) (ZRC 2000.0934.2); C. *Portunus* (*Xiphonectes*) *dayawanensis* Chen, 1986 (adapted from Chen, 1986: Fig. 1.6); D. *Portunus* (*Xiphonectes*) *pseudohastatoides* Yang & Tang, 2006 (43.0 × 21.5 mm) (ZRC 1997.762). Scale = 1.0 mm.

CHAPTER 5.

DISCUSSION

The present portunoid crab checklist of the Philippines has 115 species distributed in 21 genera. Compared to the earlier checklists, it represents the most substantial increase of species number known from Philippines so far. In earlier checklists, Estampador (1959) listed 32 species from 12 genera, while Cariaso & Garcia (1986) recorded 44 species. Of the 115 species in the present list, 60 were represented by newly collected material from the three major expeditions in the Philippines: PANGLAO 2004, PANGLAO 2005, and AURORA 2007, and supplemented by collections from Balicasag and Panglao as well. One new genus was discovered (*Cavoportunus* Nguyen & Ng, 2010); two species were found to be new from the Philippines (*Portunus calla* sp. nov. and *Portunus subtilis* sp. nov.), two other new species were found outside of the territory during the revision of *P. hastatoides* complex (*Portunus spiridonovi* sp. nov. and *Portunus shihi* sp. nov.) and eight species are recorded the first time for the Philippines: *Liocarcinus strigilis* (Stimpson, 1858); *Charybdis* (*Charybdis*) cf. *rufodactylus* Stephenson & Rees, 1968; *Thalamita multispinosa* Stephenson & Rees, 1967; *Thalamita spinimera* Stephenson & Rees, 1967; *Thalamita spinicarpa* Wee & Ng, 1995; *Thalamita malaccensis* Gordon, 1938; *Thalamita pseudopelsarti* Crosnier, 2002, and *Thalamita stephensoni* Crosnier, 1962. Of these new records, many of them are already known from the western Pacific but they have never been reported from the Philippines. *Thalamita spinimera* Stephenson & Rees, 1967, is

considered a rare species, has been reported twice (Stephenson, 1975; Chen, 1980) since the original description of one female holotype from Guam and total number of specimens collected prior to this study was four females. In this study, several specimens were found from the Philippines and for the first time, a description and illustration of the important G1 structure is provided. The same is true of *Thalamita malaccensis* Gordon, 1938, the specimen collected from AURORA 2007 expedition being only the third specimen known and the first male. One species, *Portunus tridentatus* Yang, Dai & Song, 1979, has been synonymised under *Portunus* (*Xiphonectes*) *spiniferus* Stephenson & Rees, 1967.

The number of portunid species collected during the recent expeditions (two PANGLAO, AURORA) is the highest compared to any previous expedition to the Philippines, largely due to the various and extensive collecting methods, particularly those used in the PANGLAO expeditions and the targeted sampling in underexplored areas. This has inarguably set a significant milestone in the history of marine biological exploration in the region (Bouchet, 2006; Bouchet et al., 2009; Richer de Forges et al., 2009). Furthermore, a comparision to similar checklists of portunoid crabs in other areas, clearly shows that the Philippines has the highest number of species, supporting the previous findings which considered Philippines as a "center of the center" of diversity for many taxa (Bouchet et al., 2002; Carpenter & Springer, 2005; Bouchet et al., 2009). The portunid fauna of Madagascar has 73 species (Crosnier, 1962); the Japanese checklist by Sakai (1976) has 80 species; while 69 species are known from seas around China (Dai & Yang, 1991). 36 species of genera *Charybdys* and *Thalamita* have been recorded

from the Peninsular Malaysia and Singapore in the study by Wee & Ng (1995). Apel & Spiridonov (1998) recorded 48 species from the Arabian Gulf and adjacent waters. Ng et al. (2001) listed 67 species distributed in 12 genera from Taiwan. In the most recent catalogue of Australian decapod crustaceans (Davie, 2002), the Portunoidea is represented by 100 species in 20 genera. From the Marianas, 14 genera with 54 species of Portunoidea are known (Paulay et al., 2003). In their checklist of New Caledonia (Ng & Richer de Forges, 2007), 69 species of 19 portunoid genera were presented. Catalogues of the anomuran and brachyuran crabs of the Hawaiian Islands listed 20 genera of Portunoidea with 50 species (Castro, 2011).

The species in the *Portunus hastatoides* complex was revised in this study, giving Philippines one new species (*P. subtilis* sp. nov.). It is noteworthy as the number of cryptic portunid species discovered has been increasing in recent years. Keenan et al. (1998) showed that the mud crab *Scylla serrata* (Forskål, 1775) is a complex of four species. Crosnier (2002b) revised *Parathranites* Miers, 1886, and increased the number of species in the genus from two to eight. Lai et al. (2010) found that the well-known blue swimming crab *Portunus pelagicus* (Linnaeus, 1758) consists of four species. These studies suggest a more complex speciation history for portunids than previously thought in the Indo-West Pacific region.Finally, despite the large number of taxa that have been compiled in this checklist, there are still various taxonomic issues and doubtful records that need to be resolved and confirmed, for which a detailed examination of type specimens is needed. Unfortunately, for one reason or another, the type specimens were not inaccessible or could not be loaned during the course of this study.

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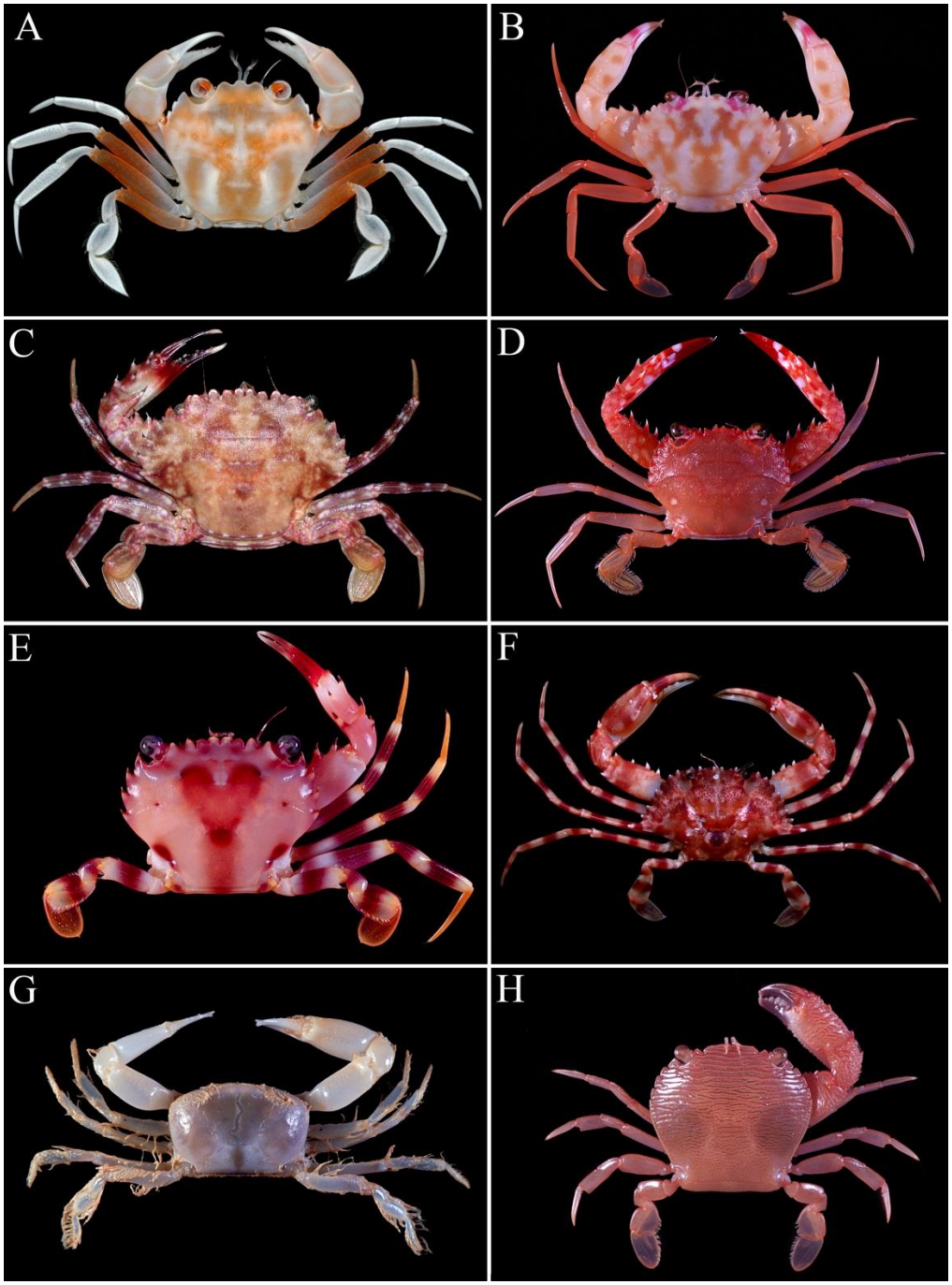

Plate. 1. Portunoidea of the Philippines. Live colouration. A. *Benthochascon hemingi* Alcock & Anderson, 1899, male (24.7 × 21.1 mm); B. *Carupra tenuipes* Dana, 1852 (no specimen); C. *Charybdis* (*Charybdis*) *hawaiensis* Edmondson, 1954, female (66.6 × 44.7 mm); D. *Charybdis* (*Charybdis*) *miles* (De Haan, 1835), male (27.8 × 20.0 mm); E. *Gonioinfradens paucidentatus* A. Milne Edwards, 1861, female (28.5 × 20.7 mm); F. *Laleonectes nipponensis* (Sakai, 1938), male (50.6 × 27.1 mm); G. *Libystes* cf. *villosus* Rathbun, 1924, male (no specimen); H. *Lissocarcinus arkati* Kemp, 1923, male (21.6 × 18.2 mm).

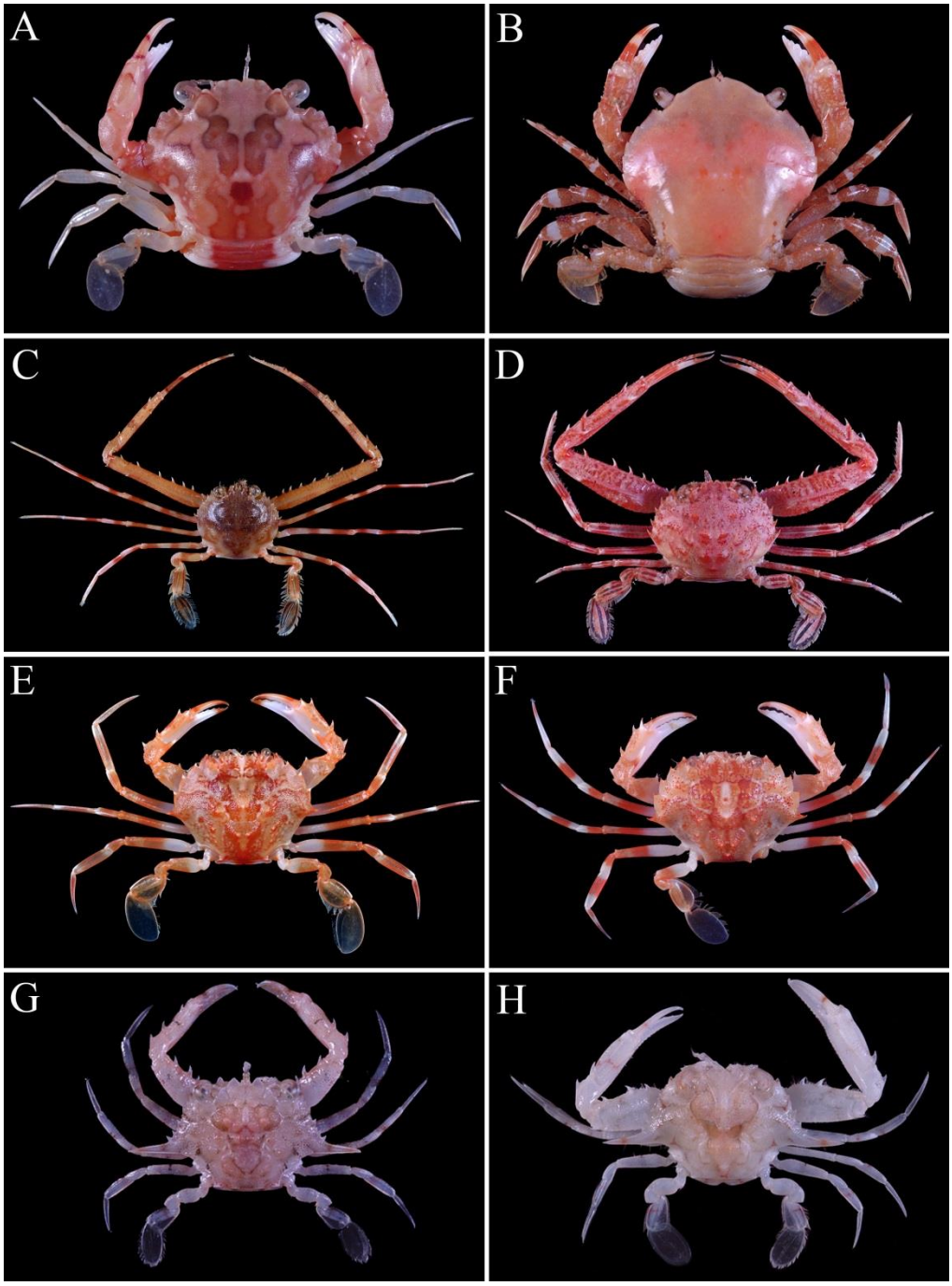

Plate. 2. Portunoidea of the Philippines. Live colouration. A. *Lissocarcinus laevis* Miers, 1886, female (11.5 × 9.3 mm); B. *Lissocarcinus polybioides* Adams & White, 1849, female (15.0 × 13.6 mm); C. *Lupocyclus philippinensis* Semper, 1880; D. *Lupocyclus tugelae* Barnard, 1950 (specimen lost); E. *Parathranites granosus* Crosnier, 2002, male (21.2 × 14.6 mm); F. *Parathranites tuberogranosus* Crosnier, 2002, male (11.7 × 8.2 mm); G. *Portunus* (*Xiphonectes*) *iranjae* Crosnier, 1962, female (12.5 × 5.8 mm); H. *Portunus* (*Xiphonectes*) *macrophthalmus* Rathbun, 1906, male (15.8 × 6.8 mm).

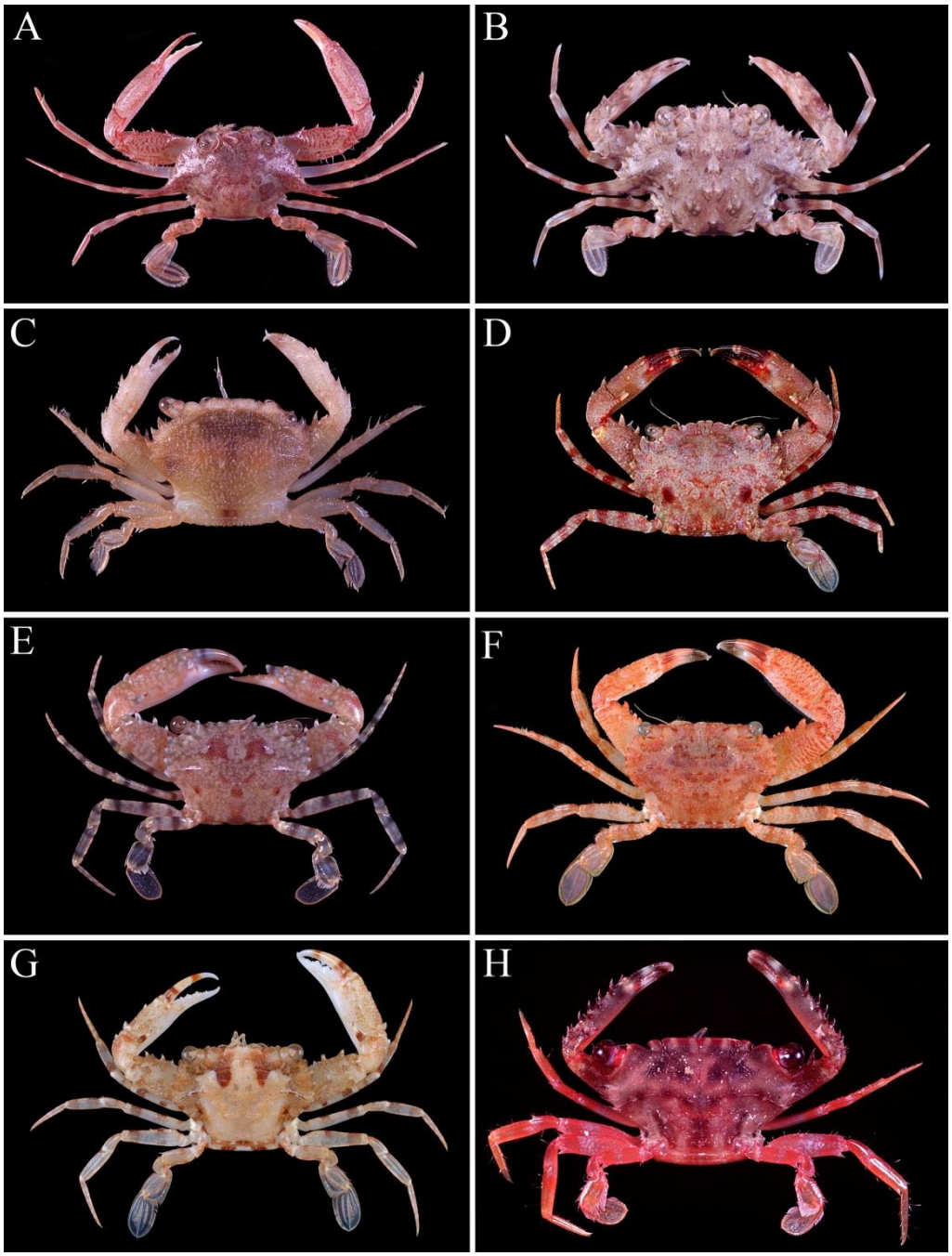

Plate. 3. Portunoidea of the Philippines. Live colouration. A. *Portunus* (*Xiphonectes*) *pulchricristatus* (Gordon, 1931), male (23.1 × 10.1 mm); B. *Portunus* (*Xiphonectes*) *spiniferus* Stephenson & Rees, 1967, female (29.8 × 13.8 mm); C. *Thalamita corrugata* Stephenson & Rees, 1961, female, (8.2 × 5.5 mm); D. *Thalamita malaccensis* Gordon, 1938, male (36.0 × 23.3 mm); E. *Thalamita mitsiensis* Crosnier, 1962, male (19.8 × 13.9 mm); F. *Thalamita oculea* Alcock, 1899, male (27.0 × 18.1 mm); G. *Thalamita spinifera* Borradaile, 1903, male (31.1 × 21.6 mm); H. *Thalamitoides quadridens* A. Milne Edwards, 1869, female (20.5 × 10.6 mm).